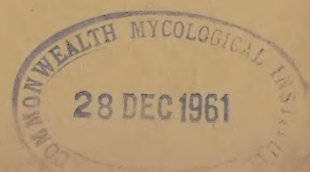
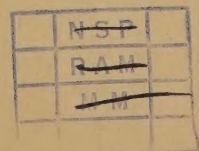


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THE SUGAR MANUFACTURERS' ASSOCIATION
(of Jamaica)
LIMITED

Mandeville, Jamaica, W.I.

ANNUAL REPORT
OF THE
RESEARCH DEPARTMENT
1959



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THE SUGAR MANUFACTURERS' ASSOCIATION (of Jamaica) LIMITED
RESEARCH DEPARTMENT

ANNUAL REPORT, 1959

A. INTRODUCTION AND SUMMARY

1. The Director attended meetings of the B.W.I. Sugar Research Scheme and the Advisory Committee of the B.W.I. Central Sugar Cane Breeding Station in Barbados in December. During the same absence he reported to the St. Kitts Sugar Producers' Association on certain aspects of sugar cane agriculture in St. Kitts.

2. The Director was appointed a member of the Government Commission of Inquiry into the Banana Industry. The Commission took up much of the Director's time between March and October.

3. The Director visited the U.K. on Banana business in April, during which time he interviewed candidates for the posts of agronomists at Bernard Lodge, Trelawny Estates and Appleton. The candidate selected for Appleton has since resigned. Mr. T. Wells has taken up his duties at Bernard Lodge and Mr. J. Murtagh at Trelawny Estates.

4. The Director was appointed by Government to the Scientific Research Committee, the Livestock Industry Development Committee and the Sugar Cane Development Committee.

5. The Director attended the Conference of the I.S.S.C.T. held in Hawaii in May; he was Chairman of the Field Section of the Conference and presented a paper on "The Potash Manuring of Sugar Cane." Whilst en route to Hawaii he interviewed candidates for the post of agronomist at Sevens Limited and selected Mr. J. L. Ramsay of the University of British Columbia who has now taken up his appointment.

6. The Director presented by invitation a paper on the "Manuring of Sugar Cane" before the Food and Agriculture Section of the British Society of Chemical Industry in London.

7. The Assistant Director of Research attended the opening day of the Commission of Inquiry into the Sugar Industry and presented a memorandum on the activities and cost of the Sugar Research Department.

8. Mr. C. E. M. Smith, agronomist in charge of sugar cane selection, visited Barbados in April to discuss and review sugar cane breeding policies with the Senior Geneticist and Geneticist of the B.W.I. Central Sugar Cane Breeding Station.

9. Mr. T. Chinloy and Mr. H. M. Thompson were away on overseas leave between 15th July and 19th September, and 1st June and 14th August, respectively.

10. Mr. I. R. Cowan, agronomist working on physical studies, who had been with the Department since

1953, resigned in September to join the staff of Nottingham University as lecturer in Soil physics.

11. During the year there were the following junior staff changes:—

Resigned: Messrs. Eustace Reynolds, M. Browne, M. Richards and J. B. Jones.

Appointed: Messrs. G. M. Mair, M. Walder, D. Chen, R. Reid and A. Davis.

12. Work continued on the new buildings of the Department, which were occupied in August.

13. Mr. F. C. Bennett, of the Commonwealth Institute of Biological Control, Trinidad, visited the Industry in connection with the incidence of West Indian Cane Fly, in January and February and again in June and July, and in October.

14. During the year a field-day was held at Worthy Park and a factory-day at Serge Island. The Annual Sectional meetings and conference of the J.A.S.T. were held at the Research Department's new buildings in Mandeville on 12th, 13th and 14th November, at which the officers of the Department read the following papers:—

"Small Moth Borer and Red Rot in Sugar Cane in Jamaica," by P. D. Manser.

"The Variety Position in Jamaica," by C. E. M. Smith.

A Report on the Sugar Industry of Hawaii prepared by the Jamaica delegates to the I.S.S.C.T. Conference was edited and published.

15. The staff co-operated with the Jamaica School of Agriculture by giving a series of lectures at the School on sugar cane agriculture and the processing of sugar cane.

16. A total of 3,826,563 tons cane were ground, 18% more than in 1958, of which 3,796,324 tons were used to produce 383,927 tons 96° sugar, at 9.89 tons cane per ton 96° sugar. Of this quantity, estates produced 2,135,503 tons cane (an increase of 7.5% on 1958), whilst farmers supplied 44.2% of the cane milled as against 38.7% in 1958 (an increase of 35% on their 1958 production).

17. The cane yield survey of sugar estates was continued. The average rate of sugar production was disappointing, at 5.52 cwt. per acre per month. Not since 1952 was this figure as low.

18. Monthly rainfall figures for each estate were recorded and circulated to the industry. The year's rainfall distribution was very abnormal, the summer

being very dry and the winter wet. The winter temperatures were much higher than those recorded in recent years.

19. Minimum air temperature was shown to correlate closely with cane quality during the early months of crop. In normal years cane quality in March, April and May is largely dependent on the absence of large "suckers" made possible by the suppression of tillering during the colder period December to February. With warm winter months, tillering was not suppressed and March, April and May reaping was affected by the high proportion of suckers of millable sizes.

20. The effects of overhead irrigation during the spring months were studied and also the effects upon yields of irrigating at increasing deficits.

21. The land preparation operations of surface irrigated, heavy clay soils became the subject of experimentation. The study of the effects of infield transport on heavy clay soils in a wet area was continued. The preliminary examination of Louisiana banks as an alternative to cambered beds in wet areas requiring drainage was encouraging.

22. The number of cultivation and miscellaneous trials in operation during the year was 42.

23. The trend to use more potash continued. The consumption of phosphate also increased.

24. A survey of the phosphate and potash removed in cane was carried out by sections on most estates but down to a field by field basis on some. The results are presented.

25. A foliar composition survey of cane on the basis of one field in three was continued. Two-thirds of the fields of estates have now been sampled. The results show the effects of drought and rainfall on the composition of samples. The survey has indicated the areas where greater application of the major plant food elements may be important.

26. Work was commenced into the technique of field experimentation. It became necessary as a result of the increasing difficulty of getting experiments reaped accurately.

27. The potash nutrition of sugar cane on heavy clay, irrigated soils was examined. The results obtained so far suggest that the physical state of the soil and the cultivation practised are important factors to be borne in mind.

28. Urea as an alternative source of nitrogen to sulphate of ammonia has proven disappointing.

29. In all, 160 experiments of all kinds dealt with the nutrition of sugar cane during the year.

30. B4362 and B41227, over the industry, are about equally important, accounting between them for 67% of the area reaped. Variety distribution is discussed in detail. About 50% of the area reaped continues to be in 3rd ratoons or older, with 36% being 4th ratoons or older.

31. During the year 95 variety experiments of all kinds were in operation.

32. B49119 compared favourably in all final trials. The characteristics of this variety are discussed. B51415 gives promise of being a good juice variety. B51131 is also under close observation because of its favourable juice.

33. Of the foreign varieties tested, NCo310 is generally the most promising. It has better juice than B41227 but its ratoon performance is very variable. Three B54 varieties may, between them, supply one commercial cane. The performance of BJ5417 is encouraging.

34. Two hundred and twenty-eight varieties of the B59 series were introduced.

35. Thirty-four thousand seedlings were produced from 170 crosses.

36. The response of different sugar cane soils to fumigation with nematocides was examined by dispersing 23 small plot experiments throughout most sugar estates. The responses obtained were small and variable.

37. Laboratory studies with cane grown in boxes showed the dominance of parasitic nematodes in unsterilized soil compared with sterilized soil, and the association of pink and brown stained cane roots with the presence of the former.

38. The reinfestation of fumigant treated soil by nematodes was examined.

39. The outbreak of West Indian Cane fly in Vere and Westmoreland is discussed as well as the findings of Mr. Bennett, of the Commonwealth Institute of Biological Control, with respect to the effects of spraying the pest with malathion on the biology of the pest and its parasites and predators.

40. *Elasmopalpus* (Jumping Borer) was identified at Monymusk and Richmond/Llandovery. On the latter the insect was responsible for much damage to ratoon sprouts on fields where stubble was burnt accidentally.

41. A Small Moth Borer survey on six estates suggests that the incidence of this pest was at a higher level during the year than was the case in 1954.

42. The soil fumigant trial at Worthy Park was continued for another year.

43. Factory and distillery reports were received, checked and circulated to sugar estates during the year. The data are presented in summary form in the Appendix to this Report.

B. NEW BUILDINGS FOR THE SUGAR RESEARCH DEPARTMENT

The new buildings for the Department were designed by Messrs. Ashwell, Dunn and Associates in such a way as to allow construction to proceed whilst the occupation of the old, temporary buildings continued. The buildings were commenced in January, 1958, and occupied in August, 1959. They consist of an office block containing a general office, private offices; a statistical laboratory, and a library/meeting hall, all joined by an interconnecting wing of washrooms, etc.,

to a long laboratory section containing a large general chemical laboratory; a second smaller chemical laboratory; interconnecting balance room; digesting room; sugar analytical suite of polarimetry laboratory cum dark room and a sugar laboratory; a biological laboratory; a physical laboratory and an office to accommodate sugar cane variety selection records. The basement to the laboratory wing is fitted up as store rooms and workshops. Construction, including the floors and roof, is of reinforced concrete.

The former administration block has been converted to the use of the veterinary officers and part will eventually be used for lunch arrangements.

The contractors were Messrs. Townend & Godfrey Bros., Ltd., of Mandeville.

C. PRODUCTION

The island's production was an all-time record, but although 45,267 tons more sugar were produced than in 1958, 574,933 tons more cane had to be processed because of the poorer cane quality. The sale of about 2,400 acres of bearing land at New Yarmouth to farmers contributed to estates' production being just short of their peak production in 1955, and to the tonnage of bought cane having increased rapidly to reach an all-time maximum of over 44% (compared, for example, with 31% in 1950) of all cane ground.

Despite the New Yarmouth sales, the total acreage of estates' land reaped was a record (64,870 acres), due mainly to the substantial increase in area reaped by Monymusk, Sevens, Innswood and Caymanas.

The average production of sugar per acre was very similar to that of the previous year (3.49 tons 96° sugar (theoretical) per acre) but the growing time was greater so that the average productivity rate declined from 5.81 to 5.54 cwt. sugar per acre per month. The latest 5-year moving average is 6.12 cwt. sugar per acre per month (the predicted figure was 6.22), and the next 5-year moving average should be of the order of 6.05. The trends are given in Figure 1.

Many estates improved their productivity compared with 1958, especially Sevens, but this was offset by the considerable and similar drop in productivity at Monymusk and Innswood. Monymusk was affected partly by the severity of a West Indian Cane Fly attack and partly by drought, whilst Innswood was not only very badly set back by drought, but started crop late and finished late. The rate of productivity of summer-cut cane falls off rapidly through May to June and July and during the 1959 crop the productivity of Worthy Park (3rd August*), Richmond (31st July), Innswood (25th July), Jamaica Sugar Estates (25th July), Frome (25th July), Vale Royal (16th July), Holland (12th July), Monymusk (11th July) and Bernard Lodge (2nd July) must have suffered appreciably from this effect. All the other estates finished cutting cane in June and must have suffered to a lesser degree. Nine estates began crop later than the middle of January. In a few instances the late termination of crop was

aggravated by strikes but generally the conclusion seems justified that factories should consider working forward into early January and late December, rather than operate in June, July and August.

Worthy Park and United Estates again produced sugar at a rate in excess of 7.0 cwt. per acre per month, whilst Barnett and Serge Island recorded their highest rates of productivity. There is little doubt

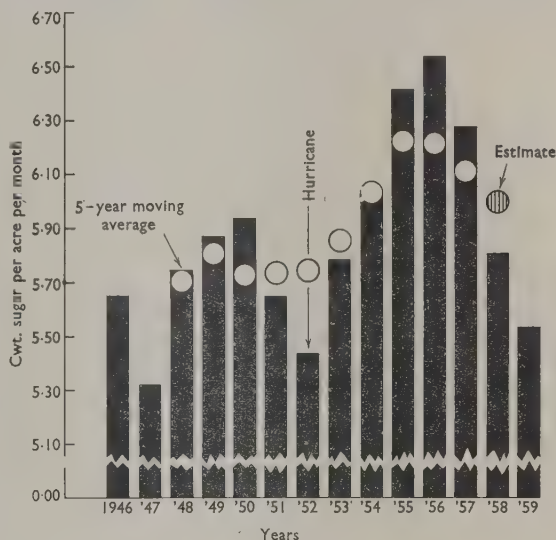


FIGURE 1
Cwt. sugar per acre per month for 1946-59 and 5-year moving averages

that the island's productivity rate will improve next year and it is confidently expected that the estates will produce sugar at a higher rate than 6.0 cwt. sugar per acre per month.

It required 9.89 tons cane to make a ton of 96° sugar compared with 9.50 in 1958; this was only partly the result of the later than usual cropping. In the last 12 years, worse cane quality was reaped in 1948 only. Although poorer than average juices were general and particularly so at Monymusk, Caymanas, Frome, Innswood, Long Pond and Vale Royal, cane quality at Appleton and Serge Island was good, and so it was at Worthy Park and United Estates.

D. CLIMATE

The rainfall distribution for 1959 was most unusual and deviated widely from the average pattern. Generally speaking, a drier than average start of crop—January to March—was followed by a normal April and May, which were succeeded by an extraordinarily dry spell which lasted for 4 months. This drought was broken in October and November with normal rains, but heavy rains marked the beginning of crop in December.

For the irrigated estates of St. Catherine and Clarendon, the 1960 crop made heavy demands on irrigation

* Date of termination of cropping.

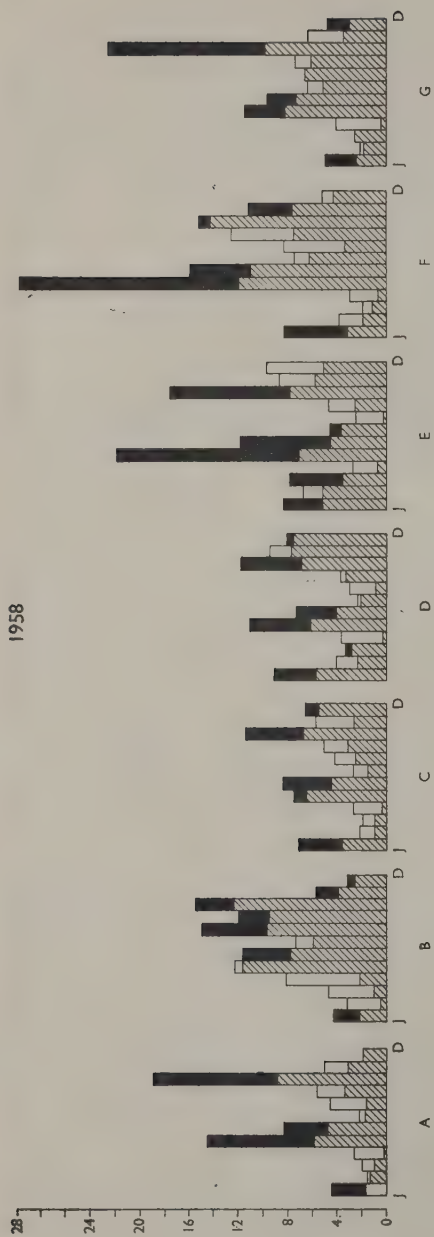
TABLE I
AVERAGE RAINFALL—INCHES

	1957												1958												1959											
	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.
Group A:																																				
Caymanas	0.650	0.552	0.89	2.68	5.340	0.02	0.45	1.14	4.64	5.63	0.55	0.30	2.181	3.861	1.26	0.04	17.05	4.001	5.6	3.14	3.981	5.24	3.31	0.82	0.31	0.28	0.10	2.05	5.23	0.04	0.51	0.45	1.15	5.15	4.26	3.77
Barnard Lodge	0.920	0.691	1.68	1.60	7.480	0.31	0.57	1.73	4.90	5.65	0.59	0.33	2.752	3.81	1.60	0.02	16.39	4.752	9.9	0.85	2.841	5.24	4.44	1.05	0.01	0.10	0.38	1.72	3.35	0.01	0.16	0.38	1.23	4.51	3.60	2.13
Innwood	0.811	0.842	0.42	0.97	4.800	0.51	0.77	0.83	4.88	6.45	0.92	0.66	4.83	0.88	0.84	0.35	5.67	5.741	7.0	1.00	4.00	11.59	3.7	2.79	1.65	0.44	1.12	2.88	5.50	0.10	0.02	0.51	1.70	3.93	3.54	
Nonwood	0.111	0.381	1.77	1.37	7.05	0.73	0.82	0.28	4.16	6.14	0.06	0.41	4.01	3.50	5.90	1.61	35.13	29.1	0.1	0.93	4.11	11.59	1.78	2.04	1.15	0.60	0.66	4.79	4.78	0.07	0.06	0.61	1.72	7.03	3.62	
Sevens	0.652	0.001	0.67	0.68	4.09	0.28	0.20	0.87	3.64	5.67	0.31	0.20	6.44	1.21	0.01	0.01	13.02	13.02	3.6	2.95	2.63	1.43	6.68	2.00	1.74	0.70	1.78	5.81	6.48	0.01	0.01	1.64	0.68	7.81	4.39	
MEANS	0.601	0.552	0.89	2.68	5.340	0.02	0.45	1.14	4.64	5.63	0.55	0.30	2.181	3.861	1.26	0.04	17.05	4.001	5.6	3.14	3.981	5.24	3.31	0.82	0.31	0.28	0.10	2.05	5.23	0.04	0.51	0.45	1.15	5.15	4.26	3.77
70-YEAR MEANS	1.631	1.471	1.90	2.58	6.724	0.79	2.16	4.44	5.54	8.724	0.99	1.79	1.531	4.71	9.02	5.8	6.73	4.732	15	1.67	3.34	18.59	3.04	1.73	1.00	0.51	0.53	3.21	5.16	0.10	0.21	1.26	1.68	5.87	3.76	4.26
Group B:																																				
Appleton	1.916	0.524	0.78	13.37	3.94	3.10	5.01	13.27	13.76	9.29	1.10	6.15	4.830	6.81	9.42	9.11	37.13	33.2	9.3	16.11	14.56	15.98	2.22	8.73	0.63	1.75	6.8	11.87	14.83	5.1	7.42	5.36	10.35	5.18	14.43	4.48
Holland	0.888	1.41	1.73	4.54	6.081	1.93	6.13	10.25	12.61	4.24	1.00	4.40	3.650	3.10	2.92	3.4	7.9	9.187	0.7	15.44	11.71	7.4	6.44	2.15	0.54	2.13	5.4	8.62	7.33	0.72	10.66	6.40	4.43	4.76	11.38	3.90
Frone	3.198	3.73	3.46	8.20	8.857	6.61	10.67	6.73	7.16	7.46	2.49	6.29	4.250	4.90	8.82	3.1	9.44	12.147	8.6	13.03	10.14	12.52	2.98	3.68	2.66	0.77	3.02	11.70	15.48	5.31	14.59	8.74	4.86	5.63	3.00	5.25
MEANS	1.997	0.63	0.33	8.70	6.09	4.23	7.97	10.05	10.84	7.00	1.53	6.51	4.240	4.45	1.01	2.19	11.63	11.54	9.5	14.86	11.96	15.18	3.86	3.19	1.27	1.71	4.08	10.73	12.53	1.8	10.99	6.83	6.88	5.16	9.57	6.81
70-YEAR MEANS	3.183	3.74	3.67	8.08	9.227	6.74	7.26	9.73	9.41	12.27	0.63	2.93	2.183	1.74	6.78	0.8	12.32	7.67	7.28	9.73	9.41	12.27	3.63	2.93	2.183	1.74	6.78	0.8	12.32	7.67	7.26	9.73	9.41	12.27	3.63	2.93
Group C:																																				
Barnett	1.156	0.51	1.83	5.57	14.73	4.26	1.91	2.43	7.24	4.52	0.85	3.85	9.010	2.80	4.60	0.65	8.91	9.82	2.64	4.07	6.69	11.27	2.04	7.32	7.69	0.94	1.87	1.79	7.03	4.54	3.28	3.25	6.85	8.66	4.25	5.09
Rose Hall	1.326	0.51	1.09	0.86	5.43	2.12	0.82	2.88	4.63	6.150	0.48	3.88	12.171	3.80	3.60	0.27	2.95	11.100	1.4	2.07	2.92	10.22	1.46	6.19	4.91	1.90	0.85	5.94	4.08	1.59	0.74	1.80	1.88	5.28	1.44	6.06
Long Pond	3.64	2.70	0.7	1.62	5.68	3.21	2.16	2.26	5.65	3.21	1.47	2.56	5.59	0.90	7.10	0.37	7.03	10.48	3.04	2.13	1.81	3.39	1.40	6.33	6.29	1.23	0.56	6.49	5.31	2.66	3.74	2.87	5.43	2.8	9.1	
Vale Royal	8.912	3.70	0.88	1.13	7.47	2.64	2.80	3.11	5.13	4.23	1.57	4.33	6.471	1.60	0.60	0.13	8.00	6.33	2.28	1.65	2.05	8.92	3.64	6.75	6.98	1.36	0.84	6.57	5.86	0.83	2.38	2.58	4.70	4.95	2.59	7.65
MEANS	2.57	4.37	1.07	2.63	8.553	3.10	2.10	2.98	5.20	4.721	2.6	3.98	7.110	0.90	0.90	0.37	7.47	8.38	1.68	2.49	3.18	11.27	2.64	6.56	6.72	1.46	1.09	5.21	5.97	2.14	2.61	2.66	4.54	5.78	2.65	6.92
70-YEAR MEANS	3.62	3.15	1.91	2.66	6.44	4.32	2.71	4.19	5.12	6.725	0.76	5.43	6.62	1.51	1.91	0.66	6.44	4.52	7.1	4.19	5.12	6.72	5.76	5.43	6.62	1.51	1.91	2.66	6.44	4.52	2.71	4.19	5.12	6.72	5.76	5.43
Group D:																																				
Rich/Land.	4.99	4.06	0.28	2.01	3.84	2.76	0.70	1.64	2.89	2.94	3.20	7.54	9.032	3.83	3.00	0.22	10.93	7.29	2.27	0.83	3.88	11.61	7.67	7.95	3.48	2.36	1.24	7.06	6.04	0.07	2.10	2.68	2.71	1.71	1.47	19.63
MEANS	5.69	4.06	2.88	3.69	6.18	4.06	2.06	2.97	3.71	6.87	3.39	7.46	5.69	4.06	2.88	3.69	6.18	4.06	2.06	2.97	3.71	6.87	3.39	7.46	5.69	4.06	2.88	3.69	6.18	4.06	2.06	2.97	3.71	6.87	3.39	7.46
Group E:																																				
Gray's Inn C.	1.662	0.78	0.12	1.44	3.73	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32
MEANS	1.662	0.78	0.12	1.44	3.73	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32	4.51	7.95	3.32
Group F:																																				
Im. Sug. Ets.	2.871	1.64	2.41	4.37	7.47	2.76	6.93	5.00	8.06	5.96	2.10	9.02	3.95	1.12	7.30	8.40	12.63	7.86	6.33	6.83	5.97	80.79	4.07	3.91	1.37	1.03	1.04	6.39	6.54	2.1	9.43	0.98	3.23	5.83	3.77	8.83
Sarge Island	1.775	3.12	0.5	2.58	13.31	7.43	5.04	4.69	14.11	12.30	3.97	0.35	8.431	5.71	2.80	4.43	10.16	29.7	1.3	2.89	5.93	18.00	9.20	3.15	1.71	2.81	9.0	5.69	9.91	0.96	4.44	2.3	4.99	19.83	4.11	4.06
MEANS	2.69	3.95	1.36	2.38	16.728	0.1	3.63	5.97	11.71	11.984	8.4	1.74	8.231	8.21	0.80	6.22	9.31	15.86	6.27	3.37	7.46	15.05	11.03	4.35	3.22	1.79	1.79	5.66	9.28	1.02	3.97	1.72	2.46	17.34	6.31	5.86
70-YEAR MEANS	2.804	0.42	0.2	3.38	11.318	1.19	6.69	7.35	10.71	13.076	7.0	4.88	2.804	0.42	0.2	3.38	11.318	1.19	6.69	7.35	10.71	13.076	7.0	4.88	2.804	0.42	0.2	3.38	11.318	1.19	6.69	7.35	10.71	13.076	7.0	4.88
Group G:																																				
United Estates	2.871	1.64	2.41	4.37	7.47	2.76	6.93	5.00	8.06	5.96	2.10	9.02	3.95	1.12	7.30	8.40	12.63	7.86	6.33	6.83	5.97	80.79	4.07	3.91	1.37	1.03	1.04	6.39	6.54	2.1	9.43	0.98	3.23	5.83	3.77	8.83
Worthy Park	2.13	0.30	4.10	4.48	6.34	2.86	5.03	3.00	9.75	8.57	5.7	3.42	5.78	5.72	3.42	5.78	5.72	3.42	5.78	5.72	3.42	5.78	5.72	3.42	5.78	5.72	3.42	5.78	5.72	3.42	5.78	5.72	3.42	5.78	5.72	3.42
MEANS	2.50	2.32	3.36	4.42	6.91	2.86	5.93																													

TABLE II

NUMBER OF DAYS IN EACH MONTH ON WHICH AVERAGE PRECIPITATION EXCEEDED 0.5 INCHES

	1957												1958												1959												
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
Group A:																																					
Caymanas ..	-	-	1	3	2	-	-	-	2	3	1	-	1	1	1	-	8	3	1	2	2	9	2	-	-	-	-	-	4	-	-	-	1	1	5	2	
Bernard Lodge ..	1	-	1	2	1	-	1	2	2	3	1	-	3	2	1	-	5	5	1	-	3	7	3	1	-	-	-	1	2	-	-	-	-	-	3	1	
Innswood ..	-	1	2	1	2	-	2	-	3	4	-	-	3	-	1	-	7	6	1	-	3	8	2	2	-	-	-	3	3	-	1	2	2	3	2		
Monynusk ..	-	-	-	-	4	3	1	-	2	3	-	-	2	1	-	-	5	7	-	-	2	3	-	2	1	1	-	2	2	-	-	2	1	3	1	2	
New Yarmouth ..	-	1	-	-	5	2	-	-	2	4	-	-	4	1	1	-	7	8	-	-	1	4	1	1	2	-	-	2	2	-	-	2	1	1	4	4	
Sevens ..	-	-	1	-	3	2	-	-	2	4	-	-	4	-	1	-	8	9	-	1	1	6	2	1	-	-	-	1	1	2	-	-	1	-	3	4	
Group B:																																					
Appletton ..	1	6	3	11	3	2	4	8	7	8	-	5	2	-	1	2	10	7	1	8	11	9	1	3	-	-	2	5	8	3	5	3	10	5	7	4	
Holland ..	1	6	1	3	4	1	4	6	9	2	1	3	2	-	-	1	7	7	5	13	7	6	5	-	-	-	2	4	6	-	9	5	4	3	8	3	
Frome ..	3	4	2	6	5	4	8	4	3	6	2	4	3	-	-	1	5	7	5	9	6	6	2	3	3	3	-	1	10	12	2	14	6	4	2	-	4
Group C:																																					
Barnett ..	-	2	2	3	9	3	2	2	6	2	-	3	4	-	-	-	6	5	1	3	3	5	1	4	-	-	1	1	5	3	4	3	5	6	4	3	
Rose Hall ..	-	2	1	-	3	2	1	1	3	4	-	2	9	1	-	-	1	6	-	2	1	6	-	4	3	2	-	4	2	1	-	2	2	3	1	2	
Hampden ..	2	1	-	2	6	4	3	3	1	4	1	2	4	1	1	1	5	5	-	1	1	10	2	3	2	1	-	5	4	1	3	3	3	4	1	4	
Long Pond ..	3	1	1	1	3	3	1	1	4	1	1	2	4	1	1	-	3	3	1	1	-	7	1	3	2	1	1	3	2	-	2	1	4	2	1	3	
Vale Royal ..	3	2	1	-	6	1	1	3	3	2	-	3	4	-	1	-	2	4	1	-	-	6	2	5	3	-	-	3	2	-	-	1	4	4	1	6	
Group D:																																					
Richmond/ Llandovery..	3	3	-	2	2	1	-	-	1	2	1	5	5	3	2	-	8	4	-	-	3	8	5	4	3	1	-	3	2	-	1	2	1	-	5		
Group E:																																					
Gray's Inn C. ...	3	4	-	-	1	2	-	-	1	1	3	6	5	1	2	1	9	8	3	-	1	9	2	2	3	-	1	6	4	-	1	-	4	2	4	3	
Group F:																																					
Jam. Sug. Ests. ..	1	2	-	1	6	5	1	4	4	7	5	1	2	1	-	-	8	9	2	-	5	7	5	4	1	1	-	3	5	-	-	-	1	5	5	5	
Serge Island ..	-	1	1	-	7	4	4	3	5	5	1	-	6	1	1	-	10	14	7	3	5	5	6	-	-	-	1	-	4	5	-	3	-	2	5	3	
Group G:																																					
United Estates ..	2	1	1	2	4	1	6	1	3	2	1	-	2	-	2	-	10	5	1	2	-	9	2	3	-	-	-	2	2	-	2	1	-	3	2	6	
Worthy Park ...	1	1	2	2	4	2	2	2	5	7	1	-	3	1	3	-	8	6	3	4	6	6	2	4	-	-	-	3	5	2	-	2	3	6	5	6	



1959

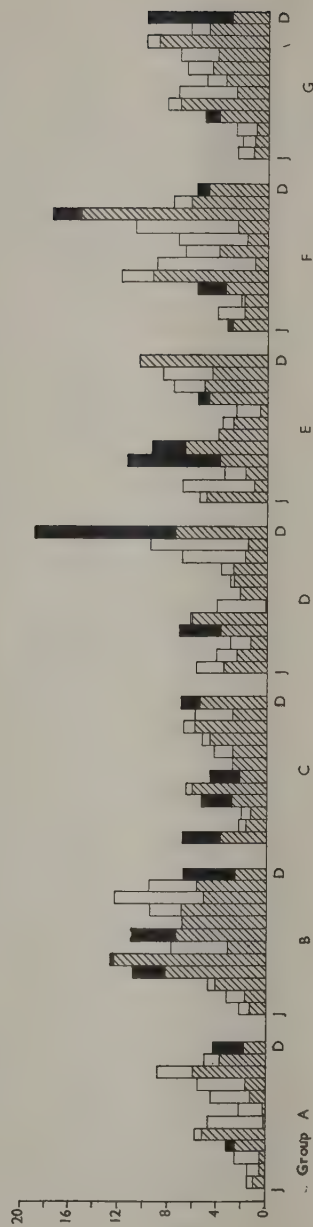


FIGURE 2
Mean Monthly Rainfall (Group A-G) (1957, 1958, 1959)

and during the dry mid-year period, irrigation intervals became progressively longer. At that time prospects for sugar production were gloomy, and were reflected in cane growth, some appearing prematurely ripe, but the late rains dispelled the gloom and the cane grew rapidly towards the end of the year, but showed little signs of ripening at the start of harvest.

yields are expected to be reasonably good, though juice quality will no doubt be relatively poor.

The average monthly rainfall figures over the last 3 years for estates in their appropriate groups, are given in Table I and illustrated in Figure 2. Table II shows the number of days in each month on which average precipitation exceeded 0.5 in.

TABLE III
EXPECTED MINIMUM RAINFALL WITH CERTAIN PROBABILITIES

ESTATE	Farm	Proba- bility	MONTH											
			Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Appleton ..	Appleton	1 in 3	3.4	3.0	5.0	10.8	14.8	8.2	7.8	12.2	12.2	14.8	7.0	4.8
		1 in 2	2.4	2.0	3.6	8.8	12.4	5.6	6.6	10.6	10.4	12.0	5.6	3.8
		2 in 3	1.6	1.5	2.4	6.2	10.0	4.0	5.4	9.0	8.6	9.8	4.4	2.8
Barnett ..	Fairfield	1 in 3	3.4	2.6	2.3	4.4	9.6	8.2	4.3	7.0	8.8	7.6	4.8	4.0
		1 in 2	2.4	1.7	1.6	3.0	7.4	6.8	3.6	5.6	7.4	6.6	3.6	3.0
		2 in 3	1.6	1.0	0.9	1.8	5.6	5.4	2.8	4.0	6.0	5.8	2.4	1.2
Long Pond ..	Etingdon	1 in 3	4.0	2.2	2.0	2.2	5.5	4.4	2.2	4.2	5.0	6.0	6.2	4.1
		1 in 2	3.3	1.5	1.3	1.4	4.1	2.9	1.8	3.1	4.2	4.8	4.8	3.0
		2 in 3	2.4	0.9	0.8	0.8	2.7	1.8	1.4	2.3	3.2	4.0	3.6	2.1
	Hyde Hall	1 in 3	4.8	3.0	2.2	2.7	7.0	5.5	3.4	5.4	6.5	7.1	7.2	5.4
		1 in 2	4.0	2.0	1.4	1.8	5.8	4.5	2.7	4.0	5.0	5.9	5.2	3.7
		2 in 3	3.2	1.5	1.0	1.4	4.4	3.5	2.1	3.0	3.9	4.8	4.0	2.6
	Long Pond	1 in 3	5.4	3.7	2.4	2.9	6.8	5.5	4.0	5.8	6.8	7.2	7.7	5.8
		1 in 2	4.0	2.8	1.6	2.2	5.7	4.2	3.1	4.5	5.3	5.9	5.7	4.5
		2 in 3	3.2	2.2	1.1	1.5	4.7	3.3	2.3	3.5	4.0	4.7	4.3	3.4
	Lottery	1 in 3	4.3	2.4	2.2	3.0	6.5	4.5	3.0	4.2	5.7	7.5	6.8	5.8
		1 in 2	3.3	1.7	1.6	2.1	5.2	3.4	2.2	3.2	4.6	6.2	5.0	4.2
		2 in 3	2.4	1.2	1.1	1.7	4.1	2.5	1.6	2.2	3.2	4.6	4.0	3.2
Richmond/ Llandovery	Llandovery	1 in 3	7.2	4.8	3.7	4.5	7.8	4.7	3.0	3.4	4.5	8.2	10.0	7.5
		1 in 2	4.8	3.3	2.3	2.7	5.3	3.2	2.0	2.5	3.3	6.3	8.0	5.7
		2 in 3	3.2	2.1	1.3	1.7	3.5	2.1	1.2	1.8	2.3	4.8	6.2	4.8
	Richmond	1 in 3	6.4	4.5	3.3	3.6	7.8	4.4	3.0	3.4	4.3	7.4	10.6	7.1
		1 in 2	4.8	3.0	2.3	2.4	5.2	3.2	2.2	2.5	3.2	6.0	8.2	5.6
		2 in 3	3.6	2.0	1.5	1.7	3.2	2.3	1.4	1.8	2.6	4.6	6.4	4.4
Vale Royal ..	Arcadia	1 in 3	5.2	3.2	2.8	3.4	6.6	4.4	3.0	4.4	4.9	6.2	8.6	7.3
		1 in 2	4.0	2.0	1.8	2.4	5.0	3.4	2.3	3.3	4.0	5.2	6.4	5.3
		2 in 3	2.8	1.2	1.1	1.5	3.7	2.5	1.6	2.4	3.3	4.2	5.0	4.0
	Oxford	1 in 3	4.4	2.4	2.0	2.7	6.9	4.6	2.6	4.0	5.1	7.1	6.4	6.2
		1 in 2	3.4	1.5	1.4	2.0	5.2	3.3	1.8	2.6	4.0	6.0	5.2	4.8
		2 in 3	2.4	1.0	0.8	1.3	3.8	2.5	1.4	1.9	3.2	4.8	4.0	3.6

The estates in Group B had more favourable growing conditions throughout the year, and did not suffer from lack of rains in the dry June to September months which affected most of the rest of the island. Unfortunately, the heavy rains continued until after the start of crop, particularly at Frome, and juice quality was seriously impaired.

Groups C, D, E, F and G had rainfall that followed the overall distribution pattern, and in the case of Richmond/Llandovery the drought extended up to the end of November. Nevertheless, the late rains have caused a tremendous upsurge of growth, and cane

As in late 1958, the temperatures during the winter months were high. This accounted to some degree for the poor juice early in the 1959 crop and will militate against good juices early in the 1960 crop.

Rainfall probability

Rainfall probability graphs have been completed for all estates for which monthly rainfall figures of 40 years and more are available. These estates include Appleton, Barnett, Frome, Long Pond, Monymusk, Richmond/Llandovery, Rose Hall, Vale Royal, and Worthy Park. The data for Rose Hall and Worthy Park were

published in the 1956 Annual Report and those for Frome and Monymusk in the 1958 report. A copy of the relevant graphs was submitted to each of the remaining estates, and a brief summary table is presented (p. 7) to illustrate some important aspects. The figures given are the minimum rainfall to be expected with a probability of 1 in 3, 1 in 2 and 2 in 3, i.e. for a 1 in 3 there is a 33% chance of obtaining at least the quantity of rainfall listed.

A definite pattern of monthly rainfall distribution is observed from the data. Precipitation, which is normally low in January, continues to decrease in February and March, and then increases slightly in April and markedly in May, generally one of the wettest months of the year. This is succeeded by moderate rains in June and a comparatively dry July. August begins the wettest period which reaches a peak in October. Rainfall decreases in November which is still quite wet, and continues to get less and less up to March. Richmond/Llandoverly shows one exception to this pattern in that the distribution becomes displaced by a month after July; August remains comparatively dry and the wet season reaches a peak in November.

The influence of air temperature on cane quality

Growth is a function of temperature and cane ripening is related to reduced growth rates. The quality of cane has varied widely from year to year in the past, and especially so at the commencement of cropping, so that variations in air temperature might be expected to have played a part—the question is, to what extent.

A preliminary examination of the Monymusk data suggested that:—

- A close relationship between cane quality and temperature exists only during the first 3 months of the year.
- Cane quality appears to show the closest relationship with mean minimum temperature if the latter is reckoned over the month previous to harvest, and
- Cane quality appears to improve with time over the first 3 months of the year irrespective of temperature as reckoned above.

Two regressions (see Figure 3) account quite adequately for the variation in juice quality up to March in each of the years 1955–59 inclusive. They are of the form:—

$$J = a + bn + cT \quad \dots \quad (1)$$

$$J = a' + b'n - c'T + d'T^2$$

$$= J = \left[a' - \frac{c'^2}{4d'} \right] + b'n + d' \left[T - \frac{c'}{2d'} \right]^2 \quad (2)$$

where J = tons cane per ton 96° sugar; n = week number (1st to 7th January = $n = 1$).

T = mean minimum temperature for weeks $n - 4, n - 3, n - 2, n - 1$.

The relationships are very highly significant (at ∞ to 1), whilst the difference between the two equations is also significant (at the 20% level).

The agreement between the actual cane quality and the derived values is illustrated in Figure 4. The

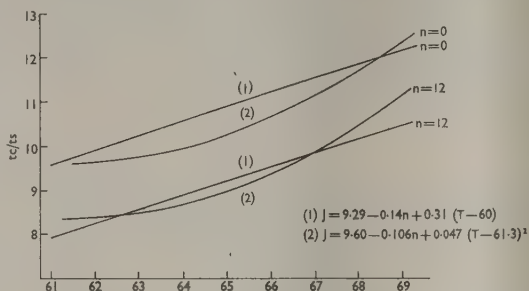


FIGURE 3
Mean minimum air temperature in °F. for the weeks $n - 4, n - 3, n - 2$ and $n - 1$.

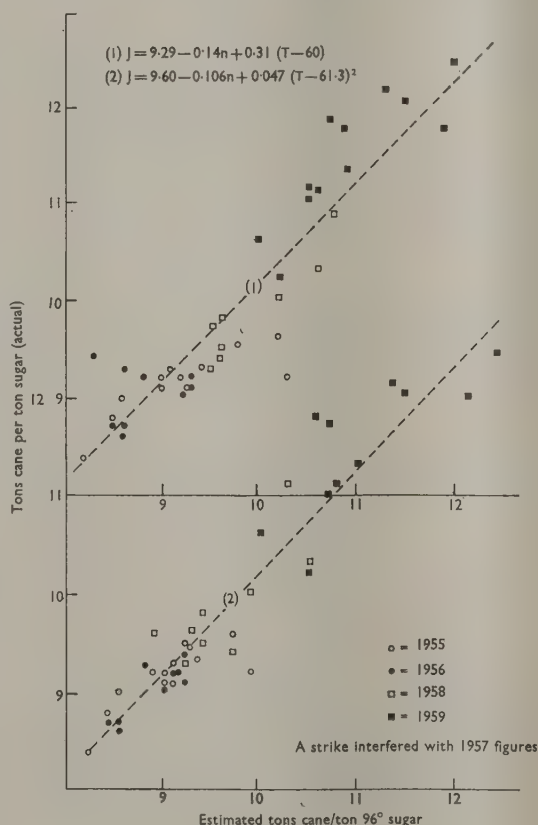


FIGURE 4

introduction of a term in T^2 in the second equation gives greater accuracy and allows of the prediction

that the maximum beneficial effect upon cane quality is obtained when $T = 61.3^{\circ}\text{F}$. Attempts made to improve the relationships further by taking into account rainfall and moisture deficits were unfruitful. It appears that rainfall is of minor importance compared with temperature when the latter is 69°F . or less. Above 69°F . the relationships become inaccurate, which is also borne out by the fact that while at Monymusk such temperatures do not occur until April, at Jamaica Sugar Estates they occur quite early in the year and here no very close cane quality : temperature relationship is found.

The minimum air temperatures for Monymusk, Jamaica Sugar Estates and Worthy Park for recent years are given in Table IV. The warmer winters of 1958 and 1959 at Monymusk are quite outstanding as well as the very favourable minimum temperatures at Worthy Park in most years.

Evaporation

Climatic studies were extended to include the open water evaporation from a standard meteorological office tank at Worthy Park under conditions very dissimilar from those at Monymusk. Estimates derived from the equation adopted for Monymusk were used, viz. :—

$$H = 0.95R_a (0.31 + 0.49 \frac{n}{N}) - T (0.40 - 0.049e_a) (0.22 + 0.73 \frac{n}{N})$$

$$\text{and } E_a = 0.35 (1 + \frac{n}{10_0}) (e_s - e_a)$$

$$\text{and } E_w = \frac{\Delta H + 0.28E_a}{\Delta + 0.28}$$

Estimates of evaporation show excellent correlation with observed values provided they are multiplied by

a factor of 0.86 (see Figure 5). It is suspected that this correction factor is connected with the heavy mists

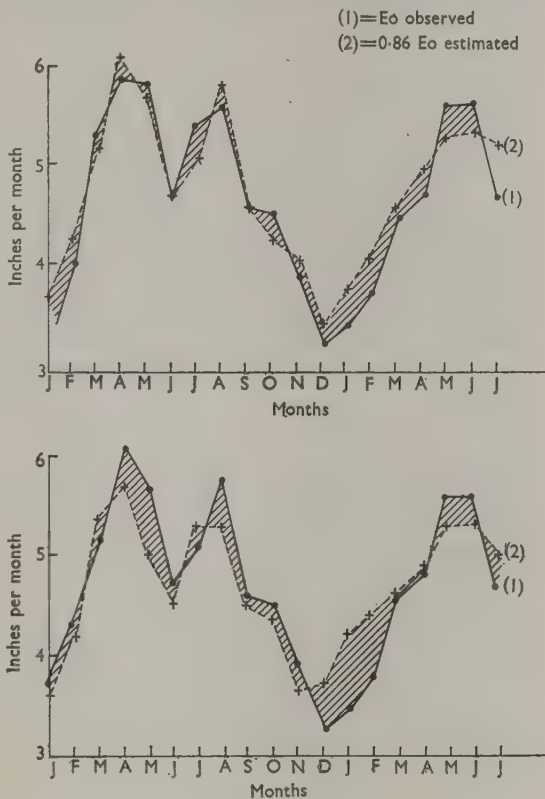


FIGURE 5

TABLE IV

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
(a) Monymusk—								
1954-55	70.7	69.8	64.4	61.1	64.0	63.6	65.3	68.8
1955-56	70.9	68.0	67.1	59.8	—	64.2	65.8	68.9
1956-57	69.6	64.8	64.3	64.6	62.6	64.1	64.6	69.0
1957-58	65.0	68.6	67.1	67.4	65.0	68.4	69.4	74.1
1958-59	72.1	70.0	68.6	67.8	67.2	68.1	67.5	69.8
1959	73.5	69.6	67.5	—	—	—	—	—
(b) Jamaica Sugar Estates—								
1954-55	72.1	70.6	69.7	67.8	70.5	67.6	68.6	70.9
1955-56	72.1	73.2	70.1	64.3	69.5	69.9	71.3	73.6
1956-57	71.3	70.6	69.2	71.5	70.3	68.6	70.4	73.7
1957-58	72.6	73.8	71.5	69.7	69.3	70.0	71.7	75.7
1958-59	74.4	72.9	70.8	70.9	71.4	70.3	72.9	73.6
1959	73.7	70.5	71.2	—	—	—	—	—
(c) Worthy Park—								
1954-55	68	65	63	61	64	60	63	69
1955-56	67	67	64	57	60	62	65	68
1956-57	68	67	64	61	61	63	63	69
1957-58	73	69	67	63.3	62.0	62.4	63.5	69.2
1958-59	66.9	65.6	63.6	62.1	60.7	60.7	64.5	63.9
1959	66.8	63.9	62.0	—	—	—	—	—

which are characteristic of the local climate at Worthy Park. About 51% of the estimated incoming radiation (R_I) is consumed in the process of evaporation and E_o shows excellent correlation with R_I as at Monymusk (see Figure 5).

E. IRRIGATION

Experiments

(i) The effect of different levels of overhead irrigation during the dry season at Frome was the object of experiments on one plant and five ratoon fields. However, after one irrigation had been applied and just before the second application of water was due, rains fell, and the deficits measured were such as to suggest that on the fields in question only at Blue Castle—Woolery and Meylersfield—Lime Kiln will significant responses to supplemental irrigation be obtained. On these two fields leaf weights collected at intervals from plots sited along a diameter of the riser distribution pattern correlated with the precipitation of irrigation on the same plots.

Rainier precipitation was measured at intervals of $\frac{1}{3}$ chain in the direction of the rows and for 3 chains on either side of each rainer. It is proposed to reap plots of $\frac{1}{3} \times \frac{1}{3}$ chain in the same direction and note if the yields are influenced by the quantity of irrigation water.

(ii) The experiment at Innswood to try and establish the relationship between irrigating at different deficits and yield, produced inconclusive results. This was in part due to the fact that differential irrigation was commenced only after the cane was 5 months of age, and continued for only 5 months, during which the highest deficit attained was about 1.25 in. Relevant data are presented in Table V.

TABLE V
THE NUMBER OF IRRIGATIONS DURING DIFFERENTIAL
IRRIGATION PERIOD AND YIELD IN TONS CANE PER ACRE

	4	3	2	1
Number of irrigations ..	35.7	33.9	32.4	33.9
Tons cane per acre ..				

Although there was a slight tendency for lower yields to be associated with fewer irrigations the evidence is inconclusive.

(iii) The effect of applying water at different deficits was the subject of study at Monymusk also, and irrigation was carried out on the 2nd ratoon crop in a saline area at mean deficits of 0.8 in., 1.3 in. and 1.7 in., the number of irrigations for the crop being 14, 7 and 5 respectively. A summary of the yields is presented in Table VI.

TABLE VI
AVERAGE DEFICIT, NUMBER OF IRRIGATIONS AND YIELD

	0.8 in. (14)	1.3 in. (7)	1.7 in. (5)
Inches deficit and number of irrigations in brackets	20.1	13.5	13.0
Tons cane per acre ..			

There is little doubt that yields will be improved by frequent applications of water in this area, but its economic value is questionable.

Uniformity of distribution of overhead irrigation units

The uniformity of a distribution test may be expressed either as the standard error of the general mean (S.E. % g.m.), or as Christiansen's coefficient of uniformity (Cu). In the former method the closer the figure is to zero the more uniform the distribution; in the latter method values range from 100 for perfect distribution to -100 for the worst possible distribution. At the normal 160 ft. spacing used by Rose Hall, the S.E. % g.m. is 45 and Cu is 51, and at Caymanas S.E. % g.m. is 33 and Cu 84.

F. CULTIVATION

Land preparation for plant cane

The capital tied up in heavy tractors is mainly determined by the nature and number of land preparation operations for replanting sugar cane, and as the period during which heavy soils are sufficiently dry for cultivation, especially the subsoil, is limited, the optimum use of capital tied up in heavy equipment is acutely affected by the nature of the operation undertaken and the results accruing.

Hitherto land preparation studies have been carried out mainly on clays and clay loams derived from inland Basin and other alluvia at Frome, Worthy Park and Appleton. These soils are generally prone to annual, acute drying cycles during the early months of the year and therefore suffer extensive cracking. Their systems of cultivation, viz. cambered beds or contour drains under conditions of natural rainfall have aided the above processes, but also have kept the soils from being waterlogged, even during months of heavy rain except when influenced by flooding or backing of water. Under the former conditions there is ample evidence of extensive subsoil cracking and of oxidation of the subsoils, and of temporary subsoil anaerobic conditions under the last-named condition. A series of experiments being conducted at Frome, Appleton and Worthy Park shows that the effects of subsoil cultivation are variable, but on average, beneficial. The effects were greatest on low-lying, clayey soils and least on free-draining loams. On the latter deep cultivation is of doubtful benefit; on clays of secondary origin in exposed positions a single cross-knifing operation appears adequate, whilst on clays in low-lying positions, and especially where influenced by the flood plain of a river, a single knifing is highly beneficial but can probably be improved upon slightly by using the deeper ripping equipment.

The land preparation necessary for heavy, surface irrigated soils has not been studied hitherto. These soils are a problem to prepare because their subsoils rarely dry to the point where they fracture adequately. During the year, four spring-planted experiments were laid out at United Estates (lower St. Catherine) (2), Innswood (1), and Sevens (1), and one autumn-planted

at Bernard Lodge. An experiment of similar design was laid out in the spring at Hampden on soil with a highly ferruginous, compacted subsoil. The experiments are designed particularly to give information on the depth of cultivation and the fineness of the clod structure necessary. Root studies suggest that the subsoil of heavy clay soils under surface irrigation are little explored by root systems. Is any effort spent on them therefore likely to be wasted? Could this effort be directed to better effect by applying it to the topsoil? The treatments tested were derived from the two-way table.

	Shallow cultivation	Deep cultivation
Coarse tilth	x	x
Fine tilth	x	x

Shallow cultivation was attained by use of a Rome harrow, and deep cultivation by the use of a knife or ripper, whilst aggregate size was varied by increasing the number of passes made by each implement. The growth of the cane suggests that very significant responses are likely to be obtained from deep cultivation, whilst leaf analyses of the trials at 5 months indicate that deep cultivation can greatly and beneficially affect the uptake of potash. Reference is made elsewhere in this report to the dependence of an adequate potash uptake on soil tilth and structure.

In view of the indications obtained at Sevens last year, it was considered desirable to incorporate sub-treatments to measure the effects of lime and gypsum on the subsoils. These materials were spread on the soil surface before any cultivation operation was carried out and incorporated in the subsoil as a result of subsequent tillage operations. The plots were further subdivided and treated with phosphate and potash in order to check on the effects of the other treatments on the uptake of each of these elements at two levels.

The effects of lime and gypsum

The plant cane effects of lime and gypsum on heavy Sydenham clays at Sevens were beneficial in plant cane and these benefits could be traced through to the physical properties of the soils. The 1st ratoon results have proven perplexing. Gypsum-treated plots gave significantly lower yields. The effect of such treatment on the uptake of phosphate and potash by the plant is being examined by superimposing split-plot treatments for phosphate and potash on the experiment.

Very worthwhile benefits continued to be recorded at both Worthy Park and Appleton from the treatment of acid, clay soils with calcium carbonate. In the case of Worthy Park, these responses can be significantly improved upon by using superphosphate or filter mud.

The effects of infield transport on yield

Weather conditions during and preceding the reaping of most of these trials during the 1957-58 crop at

Frome were good so that adverse effects to be recorded during the 1959 harvest were expected to be small, which proved to be the case generally. Three trials reaped during the 1st and 2nd weeks of January, 1958, were damaged by heavy rains (over 8.0 in.) during the 4 weeks preceding harvest. The results showed that for these trials the beds over which the cane was transported suffered badly, and on average gave yields 20% lower than the beds over which there was no transport. Cattle-cart and tractor-cart transport were equally damaging. Alternating the "draw beds" in different years was not superior to using the same "draw bed" when tractors and trailers were used for haulage. But with cattle-carts, changing "draw beds" from year to year suggested benefits. In view of the rapid extension of a new system of cultivation in the areas now cultivated in cambered beds, this work on the influence of transport on the yield of cane grown on cambered beds will be discontinued.

The effect of bagasse on heavy clay soils

The study of the benefit to be derived from bagasse incorporation in heavy clay soils was continued at Frome, Innswood and Worthy Park in five trials. No real increases in yield were noted at any of the sites, although there was a tendency in this direction at Innswood. Even here, however, the small gains would be offset by cost of transporting and handling the material. The evidence in favour of incorporating bagasse has not been forthcoming and further work on the subject is to be discontinued.

Consequences of trash burning

The 1st ratoon results of the comparison of trash incorporated into the soil before replanting and trash burnt were similar to those of the plant crop, viz. a slight though not significant tendency towards increased yields on the plots where trash was burnt before replanting. A third treatment of burning trash every crop showed no harmful effects in the 1st ratoon. No evidence has been obtained that it is necessary to increase the nitrogen application when trash is burnt.

The cultivation of soils under natural rainfall conditions

Large areas of estates' cane are grown under a cambered bed system, which undoubtedly caters well for the internal drainage of heavy soils and also copes with the backing-up of main drains or rivers. The system nevertheless suffers from being expensive to install and to maintain, and infield transport vehicles, where used, adversely affect cane growth on one bed in three, and especially so during wet weather after which bed rehabilitation becomes a major item of expense. In other areas the system is associated with the manual "heading" of cane out to the intervals. The method has relied almost entirely upon manual drain cleaning and suffers from not being easily adapted to either mechanical loading or cane cutting.

The growing of sugar cane as single rows on banks spaced 6 ft. apart was evolved in Louisiana, specially

to deal with wet conditions and a highly mechanized system of agriculture. The method has worked well under wet conditions at Jamaica Sugar Estates and under intermediate rainfall conditions at Worthy Park.

A series of trial fields was laid out in the system (using 5 ft. 6 in. spacing) at Frome during 1958, mainly on lands above the flood plain of the Cabaritta River, but otherwise on soils hitherto cultivated entirely on cambered beds. A few trial strips were also laid out by Appleton Estate under rather similar conditions.

reaping. Acutely rolling land may present difficulties which have still to be solved. The system needs to be tried out to a greater degree under surface irrigated conditions also, and especially on heavy soils of unstable tilths, particularly if longer line irrigation is to be practised. It has proven itself at 4 ft. 6 in. row widths and under surface irrigation at both Innswood and United Estates.

The number of field experiments operated pertaining to cultural and miscellaneous studies is given in Table VII.

TABLE VII
NUMBER AND DISTRIBUTION OF CULTIVATION AND MISCELLANEOUS TRIALS IN OPERATION DURING 1959 CROP

Estates	FALL PLANTS			SPRING PLANTS		RATOONS			Total
	Planted 1957	Planted 1958	Planted 1959	Planted 1958	Planted 1959	Reaped 1959			
	Reaped 1959	To be reaped 1960	To be reaped 1961	Reaped 1959	To be reaped 1960	1st	2nd	3rd	
Northern Division:									
Barnett	—	—	—	—	—	—	—	—	—
Hampden	—	—	—	—	1	—	—	—	1
Richmond/Llandoverly	—	—	—	—	—	—	—	—	—
Rose Hall	—	—	—	—	—	—	—	—	—
Trelawny Estates	—	—	—	—	—	—	—	—	—
Central Division:									
Appleton	—	—	—	—	—	—	—	—	—
Frome	—	—	—	3	6	4	17	2	32
Holland	—	—	—	—	—	—	—	—	—
Monymusk	—	—	—	—	—	—	1	—	1
New Yarmouth	—	—	—	—	—	—	—	—	—
Sevens	—	—	—	—	1	—	1	—	2
Eastern Division:									
Bernard Lodge	—	—	—	—	—	—	—	—	—
Caymanas	—	—	—	—	—	—	—	—	—
Innswood	—	—	—	—	1	—	—	1	2
Jamaica Sugar Estates	—	—	—	—	—	—	—	—	—
Serge Island	—	—	—	—	—	—	—	—	—
United Estates	—	—	—	—	2	—	—	—	2
Worthy Park	—	—	—	—	—	—	—	2	2
Gray's Inn Central	—	—	—	—	—	—	—	—	—
Totals	—	—	—	3	11	4	19	5	42

The Frome fields were established under overhead irrigation during the dry months of February, March and April. The spring plants reaped in 1959 have been an outstanding success. The system is to be extended as rapidly as equipment permits. There is no evidence that either cane yields or juice quality have been in any way inferior. In view of the very great importance of cost reduction in the future economy of the industry, other natural rainfall estates would be well advised to give the system a thorough trial. The method offers the greatest opportunity for mechanization of planting, drain maintenance, weeding, loading, and if necessary, cutting, and also permits of the added attraction of ratoons on eroded banks being renovated by a heavy earthing operation immediately following

G. NUTRITION

The type and quantities of fertilizer applied to the 1959 crop according to the different cane cycles are given in Table VIII.

The use of nitrogen remained very similar to that in previous years as also did the quantity of phosphate applied per acre. The proportion of the acreage fertilized with phosphate increased and this is expected to continue. The use of potash also increased. In the last 10 years the proportion of cane land fertilized with potash has doubled and there is no doubt this trend will also continue. The mean application of potash applied is of the order of the maintenance dressing deduced from studies of the composition of cane juice, discussed later in this report.

The phosphate and potash drain of sugar cane

During the 1959 crop an estimate was carried out of the quantities of phosphate and potash removed by cane on each individual estate and the way in which this drain compared with the plant food returned as fertilizer. The estimates are based upon the weight of mixed juice, and the composition of the mixed juice as inferred from the ratio of the mean composition of the first expressed juice to the mean composition of the

When adjusted for weights the table shows that whilst on average 93% of the potash in the mixed juice is recovered in the molasses, only 20% of the phosphate is so recovered. The "losses" are mainly accounted for by the filter mud.

In Table IX, are given the tons of K_2O and P_2O_5 removed in the mixed juice from estates-grown canes, as well as the average quantities removed per acre and per ton cane reaped.

TABLE VIII

Estates	NITROGEN				PHOSPHATE				POTASH			
	Acres fertilized	Tons N used	Mean lb. per acre	Acres fertilized % total acres reaped	Acres fertilized	Tons P_2O_5 used	Mean lb. per acre	Acres fertilized % total acres reaped	Acres fertilized	Tons K_2O used	Mean lb. per acre	Acres fertilized % total acres reaped
Fall plants	2,275	70	69	90	683	13	43	27	1,329	50	85	53
Spring plants	11,550	402	78	98	1,688	33	44	18	6,558	265	90	56
1st ratoons	11,813	409	78	99	1,686	27	35	14	7,294	296	91	61
2nd ratoons	7,052	255	81	99	843	14	38	12	4,216	165	88	59
3rd ratoons	8,320	303	82	99	1,400	24	38	17	5,408	219	89	65
Old canes	22,994	826	80	99	2,623	46	39	11	12,588	530	94	54
Totals	64,004	2,265	79	99	8,923	157	39	14	37,393	1,525	91	58

mixed juice. Juice samples were classified by section of each estate or by individual fields. The estimates are on the low side by the extent to which the two nutrients are also lost in bagasse. And, of course, in any balance struck, the rate of release of nutrients by

Phosphate (P_2O_5)

The mixed juices from eight estates' cane had a phosphate content below 300 mgm. per litre, i.e. below a figure usually accepted as being necessary for good clarification. This observation is in general agreement

THE COMPOSITION OF MIXED JUICE AND MOLASSES (from all cane milled)

Factory	% mixed juice		% final molasses	
	P_2O_5	K_2O	P_2O_5	K_2O
Barnett	0.0288	0.127	0.121	3.45
Caymanas	0.0427	0.245	—	—
Frome	0.0277	0.118	0.163	2.81
Jamaica Sugar Estates	0.0422	0.120	—	—
Monymusk	0.0457	0.344	0.169	4.86
Richmond/Llandovery	0.0221	0.160	—	—
Rose Hall	0.0282	0.171	—	—
Serge Island	0.0268	0.176	0.102	3.53
Sevens	0.0331	0.205	0.131	3.73
United Estates	0.0274	0.125	0.143	3.07
Vale Royal	0.0267	0.139	—	—
Long Pond	0.0305	0.102	—	—

soil weathering on the one hand, and loss of nutrients by drainage on the other, remain unknown. Earlier work had suggested that the composition of molasses varied with the duration of the crop, and consequently all samples were classified according to whether they fell in the 1st, 2nd, or 3rd third of crop. Twelve factories were able to submit the required number of juice samples necessary for the survey.

with that made elsewhere in this report from a study of leaf composition of sugar cane from estates' fields. On the average between 14 and 33.5 lb. P_2O_5 are removed per acre in the mixed juice, or between 0.48 and 0.89 lb. per ton cane reaped, of which only 20% ends up in the final molasses. Sugar cane responses to phosphatic fertilizers need to be kept in mind when examining the nutrition of the crop at Long Pond,

Vale Royal, Serge Island, Richmond/Llandovery and Rose Hall in particular, and to some degree at Barnett, United Estates and parts of Frome. The areas of high phosphate uptake are the alluvial soils of Monymusk, Caymanas and Jamaica Sugar Estates. If 20 lb. P_2O_5 per acre per annum can be regarded as a threshold level of sugar cane extraction, it would appear (ignoring drainage, soil weathering and soil fixation) that about 1 cwt. per acre of "single" superphosphate is a "maintenance" dressing, and with the exception of United Estates, Serge Island and Rose Hall, most estates are relying heavily on the natural phosphate supplying ability of their soils. The results of individual fields are available for a few estates, from which it appears that the phosphate content of mixed juice can account for a maximum drain of up to 76 lb. P_2O_5 per acre or 1.82 lb. P_2O_5 per ton cane at Cumberland Pen, Caymanas.

supply is borderline, which is in fact borne out by the potash response and leaf composition of sugar cane on this estate, over the years. With the possible exception of Long Pond, Vale Royal, Frome and Barnett, most estates are drawing very heavily on the natural potash supplying ability of their soils.

The heavy removal of K_2O per acre at Sevens and Caymanas is associated with a high proportion of their fields producing cane with K_2O % dry matter in excess of 1.30%. In the case of Monymusk, an estate producing a very heavy drain per acre and the highest removal of potash per ton cane, only about one-half of the fields have leaf potash contents in excess of 1.30% dry matter. This condition seems related to cane growth, soil air and soil water during the first half of the year of cane life and is probably related more to root activity than to soil potash supply.

TABLE IX
POTASH AND PHOSPHATE SURVEY—CROP 1959

Estate	Tons K_2O removed in cane (juice)	Lb. K_2O removed		Balance* lb. K_2O per acre	Tons P_2O_5 removed in cane (juice)	Lb. P_2O_5 removed		Balance* P_2O_5 Per acre
		Per acre	Per ton cane			Per acre	Per ton cane	
Barnett	37.514	84	2.57	— 9.5	9.075	20.0	0.62	—16.69
Caymanas	222.824	173	4.38	—145.6	43.307	33.5	0.81	—33.50
Frome	409.327	86	2.28	+ 24.0	100.400	21.0	0.56	—19.00
Jamaica Sugar Estates	124.175	90	2.26	— 68.0	39.971	29.0	0.73	—15.00
Monymusk	1,114.573	166	5.30	—163.0	186.840	28.0	0.89	—27.00
Richmond/Llandovery	84.371	106	3.37	— 41.0	11.816	15.0	0.47	—11.70
Rose Hall	50.890	88	3.42	— 22.1	8.956	16.0	0.60	+27.90
Serge Island	73.606	89	2.79	— 19.1	12.699	15.0	0.48	— 1.17
Sevens	170.539	148	4.11	—145.8	28.899	25.0	0.70	—23.40
United Estates ..	110.022	99	2.83	— 36.0	22.722	20.0	0.58	— 5.00
Vale Royal	71.572	73	2.80	— 9.9	13.748	14.0	0.54	—14.00
Long Pond	46.199	57	1.83	+ 53.1	14.128	17.0	0.56	—17.00

* = Difference between quantity applied as fertilizer and quantity removed in mixed juice.

Potash (K_2O)

The potash content of mixed juice varied from 0.118 to 0.344% whilst the mean quantities of potash removed per acre in mixed juice varied between 57 lb. and 173 lb., or from 1.83 lb. to 5.30 lb. per ton cane milled. The heaviest drain recorded was 0.832 lb. K_2O per acre in 18 months, or 10.7 lb. K_2O per ton cane (at Ferry No. 8/44 Caymanas) on alluvial soil, recently reclaimed from near-swamp conditions. Barnett, Frome, Serge Island, United Estates and Vale Royal are sugar estates upon which potash deficiencies used formerly to be general but which have largely corrected these over the years by the widespread application of potassic fertilizers. In these circumstances it is interesting to note that the drain per ton of cane on these estates is very similar, at 2.26 to 2.83 lb. K_2O per ton, corresponding to a drain per acre of between 73 and 99 lb. K_2O , and therefore, excluding drainage, weathering and fixation, at least 1.5 cwt. per acre muriate of potash are necessary as a maintenance dressing. The potash drain at Jamaica Sugar Estates is interesting in that it suggests that soil potash

Foliar composition survey of sugar estates

The leaf composition survey commenced in 1958 was carried on in 1959 when over 1,900 fields, or approximately one-third of all fields on sugar estates, were sampled. The cane was between 5 and 6 months of age at the time of sampling. The sampling period prior to late September was characterized by being very short of rain, whilst the succeeding period had well distributed heavy rains. The results have therefore been divided into those samples taken a minimum of 10 days after the advent of rains, and the remainder. In the table which follows (Table X), the results are presented according to the distribution of samples within estates by level of nutrient composition. In the case of thirteen estates, on average, 56% of the fields sampled were during the "dry period," whilst the remaining five estates were sampled mainly in the "rainy period." Cumulative frequency curves for the samples analysed are given in Figure 6, where samples have been classified according to the level of nutrient in the tissue during and after the "dry period." The results show that whereas both nitrogen and potash

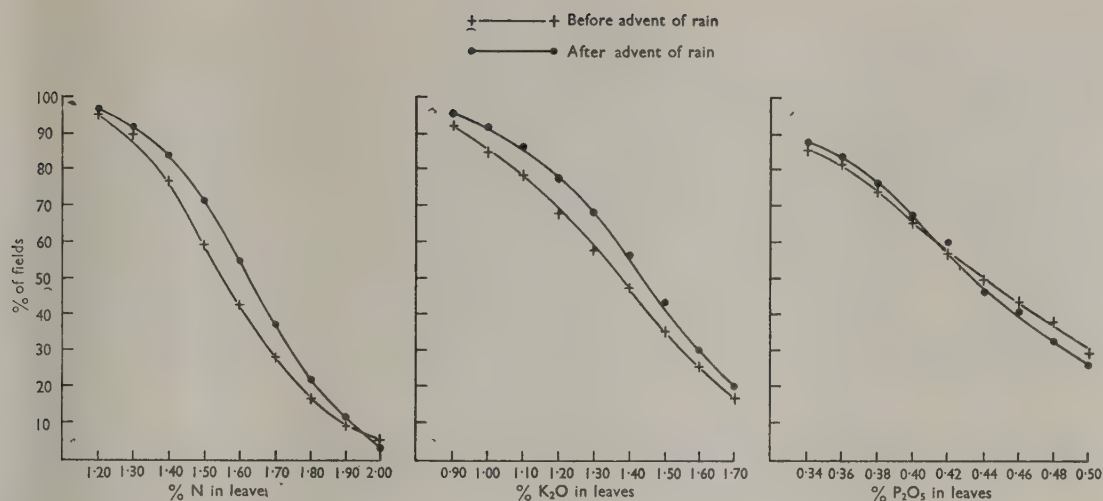


FIGURE 6

Cumulative frequency curves for N, K₂O, P₂O₅

TABLE X

% OF ESTATE FIELDS (SAMPLED) CLASSIFIED ACCORDING TO THE LEVEL OF NUTRIENT ELEMENT CONCENTRATION IN THE DRY MATTER OF LEAVES

(a) Nitrogen % dry matter

(i) Samples taken after advent of rain

Estate	0.00 to 1.20	1.21 to 1.30	1.31 to 1.40	1.41 to 1.50	1.51 to 1.60	1.61 to 1.70	1.71 to 1.80	1.81 to 1.90	1.91 to 2.00	2.01 and over	Adequate rainfall % total
1. Bernard Lodge ..	3.1	7.1	12.6	19.7	18.9	18.1	13.4	4.7	2.4	—	44.9
2. Caymanas ..	1.2	—	—	2.5	12.3	12.3	23.4	23.4	18.5	6.2	37.7
3. Gray's Inn Central ..	—	—	9.7	9.7	16.1	12.9	22.6	9.7	16.1	3.2	81.6
4. Hampden ..	—	2.6	9.0	12.8	16.7	17.9	16.7	12.8	9.0	2.6	45.9
5. Inwood ..	3.3	7.2	11.8	14.4	19.0	20.9	15.0	2.6	5.2	0.7	63.2
6. Long Pond ..	1.6	3.2	8.1	21.0	9.7	16.1	14.5	14.5	8.1	3.2	29.3
7. Monymusk ..	—	0.4	2.2	12.6	17.5	20.6	20.6	12.6	7.2	6.3	22.2
8. New Yarmouth ..	—	—	13.6	22.7	31.8	18.2	9.1	—	4.5	—	36.1
9. Richmond ..	—	1.0	6.3	10.4	18.8	17.7	21.9	12.5	10.4	1.0	82.8
10. Rose Hall ..	3.7	7.4	14.8	22.2	22.2	13.6	6.2	4.9	3.7	1.2	65.3
11. Sevens ..	—	—	—	11.9	19.0	28.6	19.0	11.9	9.5	—	39.7
12. Vale Royal ..	4.3	8.1	11.4	10.0	14.3	11.4	12.9	12.9	9.5	5.2	86.1
13. Worthy Park ..	—	6.8	4.3	8.5	13.7	21.4	15.4	13.7	5.1	11.1	80.1
Average 1-13 ..	1.7	4.4	7.8	13.0	16.9	17.5	16.3	10.8	7.8	3.9	
14. Appleton ..	—	—	2.4	11.2	19.2	16.0	19.2	15.6	6.4	10.4	
15. Barnett ..	13.8	10.3	24.1	10.3	13.8	13.8	10.3	—	3.5	—	
16. Holland ..	—	—	—	2.3	11.4	22.7	31.8	22.7	4.5	2.3	
17. Serge Island ..	—	—	9.5	4.8	47.6	14.3	14.3	9.5	—	—	
18. United Estates ..	1.3	2.6	12.1	19.4	21.6	21.1	7.8	9.9	4.3	—	
Average 14-18 ..	1.6	2.0	8.9	14.2	20.6	19.1	13.8	12.0	4.7	3.1	
Average 1-18 ..	1.7	3.7	8.1	13.3	17.8	17.9	15.6	11.1	6.9	3.7	

TABLE X—continued

(ii) *Samples taken before advent of rain*

1. Bernard Lodge ..	8.3	10.9	17.3	16.0	18.6	14.7	8.3	3.2	0.6	1.9	
2. Caymanas ..	0.8	0.8	8.2	14.9	19.4	17.2	14.9	9.7	6.0	8.2	
3. Gray's Inn Central ..	—	—	42.9	28.6	—	28.6	—	—	—	—	
4. Hampden ..	3.3	10.9	19.6	26.1	20.7	7.6	5.4	5.4	1.1	—	
5. Innswood ..	7.9	14.6	19.1	12.4	6.7	7.9	15.7	12.4	2.2	1.1	
6. Long Pond ..	2.0	8.7	20.7	17.3	19.3	8.7	8.7	5.3	4.7	4.7	
7. Monymusk ..	0.9	2.7	10.6	14.6	15.1	16.4	16.8	9.2	7.4	6.0	
8. New Yarmouth ..	—	2.6	28.2	43.5	20.5	5.1	—	—	—	—	
9. Richmond ..	—	1.7	12.1	17.2	20.7	17.2	5.2	15.5	3.4	6.9	
10. Rose Hall ..	—	18.6	14.0	18.6	20.9	7.0	2.3	9.3	4.7	4.7	
11. Sevens ..	1.6	6.2	15.6	32.8	23.4	14.1	4.7	1.6	—	—	
12. Vale Royal ..	2.9	20.6	20.6	8.8	11.8	17.6	11.8	—	5.9	—	
13. Worthy Park ..	—	—	10.3	20.7	44.8	13.8	—	3.4	6.9	—	
Average 1-13 ..	2.0	5.7	14.0	17.2	17.2	14.2	12.4	7.7	5.1	4.5	

(b) P₂O₅ % dry matter(i) *Samples taken after advent of rain*

Estate	0.00 to 0.34	0.35 to 0.36	0.37 to 0.38	0.39 to 0.40	0.41 to 0.42	0.43 to 0.44	0.45 to 0.46	0.47 to 0.48	0.49 to 0.50	0.51 and over	Adequate rainfall % total
1. Bernard Lodge ..	—	1.6	2.4	3.9	5.5	11.0	7.1	12.6	7.9	48.0	44.9
2. Caymanas ..	—	2.5	7.4	12.3	16.0	6.2	6.2	7.4	14.8	27.1	37.7
3. Gray's Inn Central ..	9.7	9.7	9.7	12.9	12.9	6.5	12.9	12.9	12.9	—	81.6
4. Hampden ..	19.2	6.4	9.0	5.1	14.1	10.3	5.1	14.1	—	16.7	45.9
5. Innswood ..	5.2	5.2	5.2	7.8	9.8	9.8	11.1	12.4	6.5	26.8	63.2
6. Long Pond ..	6.5	—	4.8	1.6	4.8	12.9	8.1	16.1	9.7	35.5	29.3
7. Monymusk ..	5.4	0.9	4.0	6.3	6.3	9.0	5.4	6.7	5.4	50.7	22.2
8. New Yarmouth ..	18.2	—	31.8	9.1	13.6	9.1	9.1	4.5	—	4.5	36.1
9. Richmond ..	11.5	11.5	15.6	11.5	10.4	14.6	6.3	4.2	6.3	8.3	82.8
10. Rose Hall ..	25.6	9.0	10.3	9.0	9.0	2.6	3.8	5.1	11.5	14.1	65.3
11. Sevens ..	—	—	2.4	9.5	2.4	28.6	7.1	14.3	7.1	28.6	39.7
12. Vale Royal ..	26.2	3.8	11.4	17.6	11.9	10.5	4.8	4.8	2.9	6.2	86.1
13. Worthy Park ..	13.7	3.4	7.7	8.5	13.7	0.9	7.7	2.6	5.1	36.8	80.1
Average 1-13 ..	11.2	3.9	7.8	9.2	9.8	9.5	6.7	8.3	6.4	27.3	
14. Appleton ..	5.6	5.6	20.0	15.2	8.8	10.4	7.2	8.8	4.8	13.6	
15. Barnett ..	17.2	6.9	6.9	10.3	13.8	6.9	3.4	6.9	—	27.6	
16. Holland ..	15.9	13.6	22.7	20.5	4.5	11.4	6.8	—	2.3	2.3	
17. United Estates ..	24.6	11.6	12.9	18.1	9.9	6.5	3.4	3.4	3.0	6.5	
18. Serge Island ..	9.5	19.0	23.8	19.0	4.8	9.5	4.8	4.8	—	4.8	
Average 14-18 ..	17.3	10.2	16.0	17.1	9.1	8.2	4.9	4.9	3.1	9.1	
Average 1-18 ..	12.8	5.5	9.9	11.2	9.6	9.1	6.3	7.4	5.6	22.7	

(ii) *Samples taken before advent of rain*

1. Bernard Lodge ..	1.3	0.6	4.5	10.3	4.5	21.2	7.7	8.3	10.9	30.8	
2. Caymanas ..	8.2	5.2	11.2	13.4	9.7	16.4	6.7	7.5	6.0	15.7	
3. Gray's Inn Central ..	42.9	—	28.6	—	—	14.3	—	14.3	—	—	
4. Hampden ..	46.7	6.5	18.5	13.0	3.3	6.5	—	2.2	1.1	2.2	
5. Innswood ..	27.0	10.1	3.4	10.1	6.7	1.1	4.5	7.9	5.6	23.6	
6. Long Pond ..	4.7	—	4.0	5.3	8.0	8.0	14.0	15.3	10.0	30.7	
7. Monymusk ..	6.4	2.9	6.2	6.9	4.9	8.5	4.4	7.4	7.1	45.4	
8. New Yarmouth ..	20.5	—	23.1	12.8	—	7.7	10.3	10.3	10.3	5.1	
9. Richmond ..	20.7	—	15.5	17.2	10.3	13.8	—	8.6	1.7	12.1	
10. Rose Hall ..	37.0	8.7	15.2	8.7	13.0	6.5	2.2	2.2	2.2	4.3	
11. Sevens ..	18.7	12.5	4.7	6.2	15.6	7.8	6.2	12.5	10.9	4.7	
12. Vale Royal ..	32.4	11.8	14.7	8.8	2.9	5.9	2.9	11.8	5.9	2.9	
13. Worthy Park ..	37.9	10.3	13.8	10.3	6.9	6.9	6.9	3.4	3.4	—	
Average 1-13 ..	12.6	3.8	8.0	8.7	6.2	9.7	5.5	8.2	7.1	30.2	

TABLE X—continued
(c) K₂O % dry matter

(i) Samples taken after advent of rain

Estate	0.00 to 0.90	0.91 to 1.00	1.01 to 1.10	1.11 to 1.20	1.21 to 1.30	1.31 to 1.40	1.41 to 1.50	1.51 to 1.60	1.61 to 1.70	1.71 and over	Adequate rainfall % total
1. Bernard Lodge ..	—	—	0.8	4.7	4.7	11.8	11.0	20.5	14.2	32.3	44.9
2. Caymanas ..	1.2	—	1.2	3.7	4.9	6.2	8.6	19.7	19.7	34.5	37.7
3. Gray's Inn Central ..	—	—	—	3.2	6.5	12.9	29.0	29.0	16.1	3.2	81.6
4. Hampden ..	—	1.3	2.6	3.8	12.8	25.6	20.5	19.2	7.7	6.4	45.9
5. Innswood ..	3.9	2.6	7.8	8.5	9.2	7.8	18.3	15.7	11.8	14.4	63.2
6. Long Pond ..	—	1.6	—	4.8	3.2	9.7	9.7	11.3	11.3	48.4	29.3
7. Monymusk ..	4.9	7.2	13.5	17.0	13.5	14.8	9.4	7.2	4.5	8.1	22.2
8. New Yarmouth ..	9.1	13.6	13.6	—	13.6	4.5	9.1	9.1	9.1	18.2	36.1
9. Richmond ..	2.1	8.3	26.1	22.9	11.5	12.5	6.3	4.2	2.1	4.2	82.8
10. Rose Hall	1.3	—	5.1	11.5	14.1	17.9	7.7	11.5	6.4	24.3	65.3
11. Sevens ..	—	—	—	2.4	4.8	4.8	11.9	14.3	7.1	54.7	39.7
12. Vale Royal ..	4.3	0.9	1.9	8.1	11.0	12.9	15.2	13.3	9.0	23.3	86.1
13. Worthy Park ..	—	—	—	1.7	8.5	6.8	14.5	16.2	21.4	30.8	80.1
Average 1-13 ..	2.4	2.7	6.2	8.9	9.7	12.0	12.8	13.7	10.3	21.2	
14. Appleton ..	—	1.6	1.6	1.6	22.4	27.2	23.2	11.2	8.8	2.4	
15. Barnett ..	10.3	6.9	6.9	31.0	13.8	10.3	10.3	10.3	—	—	
16. Holland ..	—	4.5	6.8	6.8	2.3	6.8	11.4	11.4	34.1	15.9	
17. Serge Island ..	—	—	—	4.8	9.5	19.0	14.3	14.3	14.3	23.8	
18. United Estates ..	1.7	3.9	11.6	14.7	16.4	13.4	15.5	8.2	6.5	8.2	
Average 14-18 ..	1.6	3.3	7.6	10.9	16.2	16.7	16.9	9.6	9.8	7.6	
Average 1-18 ..	2.2	2.8	6.6	9.4	11.4	13.2	13.8	12.7	10.2	17.7	

(ii) Samples taken before advent of rain

1. Bernard Lodge ..	—	—	1.3	1.3	2.6	7.7	16.0	15.4	15.4	40.4	
2. Caymanas ..	3.0	3.0	7.5	9.7	8.2	11.9	11.9	12.7	11.2	20.9	
3. Gray's Inn Central ..	—	—	14.3	—	—	—	14.3	14.3	42.9	14.3	
4. Hampden ..	—	—	—	2.2	6.5	12.0	23.9	13.0	18.5	23.9	
5. Innswood ..	13.5	11.2	12.4	19.1	16.9	11.2	7.9	3.4	2.2	2.2	
6. Long Pond ..	2.0	1.3	0.7	8.7	7.3	4.7	11.3	8.0	12.0	44.0	
7. Monymusk ..	10.6	11.5	9.0	14.5	12.3	9.7	10.4	7.9	4.5	9.5	
8. New Yarmouth ..	—	—	—	—	—	7.7	28.2	7.7	17.9	38.5	
9. Richmond ..	3.4	6.9	12.1	13.8	12.1	19.0	19.0	5.2	5.2	3.4	
10. Rose Hall ..	—	—	—	2.2	6.5	10.9	15.2	21.7	17.4	26.1	
11. Sevens ..	—	1.6	1.6	7.8	15.6	6.2	7.8	14.1	15.6	29.7	
12. Vale Royal ..	—	—	2.9	5.9	14.7	11.8	17.6	14.7	14.7	17.6	
13. Worthy Park ..	—	—	6.9	13.8	13.8	31.0	10.3	20.7	—	3.4	
Average 1-13 ..	6.2	6.6	6.3	10.7	10.2	10.0	12.6	10.0	8.8	18.5	

levels in the tissue are sensitive to the moisture strain suffered by the plant, the levels being lowered by drought, the phosphate level has remained relatively unaffected. The effect of nitrogen is greatest (and equals 0.075%) in the intermediate levels, being least affected on fields of high uptake in the presence of adequate irrigation, and on fields of very inadequate nitrogen supply. Potash levels are even more sensitive than nitrogen, and are influenced to the extent of 0.10%. Making allowance therefore in the levels for nitrogen and potash during the "dry period," the curves strongly suggest that as a general statement, greater use should be made of all three fertilizers, especially nitrogen. Thus of the fields sampled, it appears that about 70% are adequate in potash uptake; about 60% in phosphate; and 57% in nitrogen.

A more detailed examination of the data suggests that estates should allocate the following importance to further inquiries into the levels of plant food uptake. The distribution diagrams of individual estates show

	Little importance (mainly maintenance considerations)	Medium importance	Great importance (probably necessary to embark upon a deliberate policy of building up soil supplies of phosphate and potash)
(a) <i>Nitrogen</i> Appleton, Caymanas Holland, Serge Island	Gray's Inn Central, Monymusk, Richmond, Sevens, United Estates, Vale Royal, Worthy Park	Barnett, Bernard Lodge, Hampden, Innswood, Long Pond, New Yar- mouth, Rose Hall	
(b) <i>Phosphate</i> Bernard Lodge, Long Pond, Monymusk	Appleton, Caymanas, Innswood, Sevens, Worthy Park	Barnett, Gray's Inn, Hampden, Holland, New Yarmouth, Richmond, Rose Hall, Serge Island, United Estates, Vale Royal	
(c) <i>Potash</i> Appleton, Bernard Lodge, Caymanas, Gray's Inn, Hamp- den, Holland, Long Pond, New Yar- mouth, Rose Hall, Serge Island, Sevens, Vale Royal, Worthy Park	Innswood, United Estates	Barnett, Monymusk, Richmond	

that it is where cane is well supplied with potash that the nitrogen status responds to the advent of rains by increasing, which confirms that the balance between N and K is of importance. The levels of nitrogen dressings on many of the estates classified under "nitrogen uptake being of medium importance" are probably adequate, but are being restricted in value because of an inadequate potash uptake. Areas of Monymusk and Richmond, for example, are so affected. Amongst the estates classified as having need to attach little importance to phosphate is Monymusk, and in the case of this estate, the statement should be qualified by stating that although this is generally true, unlike the other two estates in this group, Monymusk does have a small percentage of the fields examined which is definitely deficient in the uptake of phosphate.

Field experiment technique

Labour conditions have made it increasingly difficult to reap the requisite number of $3 \times 3 \times 3$ NPK experiments necessary for routine nutrition control. In any case it would now appear to be better utilization of effort were the form of sugar cane response curves to be accepted as defined, and energy devoted to measuring with greater precision responses to standard dressings of nutrient. Accordingly, and since past work has shown that interactions between major nutrients as reflected in yield are rare, treatments have been simplified to include only the following combinations—control, NP, NK, and PK. In the interests of an adequate coverage of experiments, the work has kept two aims in view—(i) an experiment which can be reaped in one day or (ii) an experiment which can be reaped by the junior field staff of sugar estates without dislocation of cutters and transport. The former is based upon very small plots (3 rows by 0.5 chain or 4 rows by 0.5 chain), and if successful will be a micro plot technique in which the indicator plant is sugar cane itself. The second relies upon large plots of the order of 1/12th to 1/10th acre. The following programme of experiments was laid out and leaf sampled during the year.

(a) Eighty blocks of four treatments each, in eighty different fields and operated statistically as eighty "dispersed blocks," of plot size 3 rows $\times$ 0.5 chain; seventeen placed as "dispersed blocks" on an equal number of fields, of plot size 4 rows $\times$ 0.5 chain, and ten 4×4 latin squares, on ten different fields also with plots 4 rows $\times$ 0.5 chain.

(b) Ten dispersed blocks on ten fields; four experiments of two blocks (= replicates) each of four fields; and one 4×4 latin square.

In addition, a further nine blocks laid out under (a) were lost. Although decision will be taken in the light of actual yield data, observations made during the year suggest that very small plots are likely to be out of the question.

Further studies on nutrition control in the field

On three sugar estates detailed control of nutrition has been carried out (in association with the staff of

the sugar estates concerned) by augmenting leaf composition surveys by plots treated with extra fertilizer or by a series of dispersed block, fertilizer experiments. The "extra" fertilizer plots were placed on one field in three, or one field in two, and leaf composition and yield compared with control plots. The results suggest that on one estate, potash applications were adequate; nitrogen might be increased slightly (≈ 0.5 to 1 cwt. per acre sulphate of ammonia) and that although phosphate was generally adequate, areas exist where greater attention will have to be attached to the plant food. On another estate, now that potash levels have been improved, greater dressings of nitrogen seem possible. The series of dispersed blocks consisted of one block to each field of fertilizer treatments in excess of the normal field fertilizer dressing, thus—NP, NK, PK, Control; and similar treatments in which the extra nitrogen was not applied at the usual time but when the cane stubble was 5 to 6 months old. In all, sixty-eight fields were involved. The results confirm that little extra benefit is to be obtained from increasing nitrogen generally, even when extra nitrogen was applied late. There were two areas, however, where dressings might be increased to the order of 5 cwt. per acre of sulphate of ammonia. Evidence was obtained that potash might be generally increased to a total application of around 3 cwt. per acre of muriate of potash, and that on almost one-half of the total area, phosphate dressings should be tried at an average dressing of 3 cwt. per acre of single superphosphate. It has been suggested that these heavier fertilizer dressings be tried during the 1960 crop on a large number of half-fields.

Potash nutrition on the Sydenham clay soils of Vere

Leaf analyses have indicated that in certain areas of the above soils cane suffers during the first half of its life from potash deficiencies of various severities. The areas most involved are the Exeter and Springfield Sections of Monymusk. The histograms given in Figure 7 show the distribution of fields according to the level of potash in the dry matter of their leaf lamina material, for the area of Monymusk, west of the Minho River, and for an area of rather similar soils at the Parnassus Section of Sevens Ltd. This relatively inadequate leaf uptake occurs despite soil available potash being around 115 p.p.m. K_2O in the upper 12 in. of soil. Indeed, by the time the cane is reaped, potash uptake by the plant as reflected in the potash concentration of mixed juice is, even by Monymusk standards, high, and very high by comparison with other sugar estates (see Table XI).

Clearly whether cane growth is actively limited by an inadequate uptake of potash in the early half of its life on the lands under discussion, late in the life of the plant uptake and concentration in the stalk are extremely heavy. The potash nutrition of sugar cane in this area is under examination. During the year, fifteen experiments were put in the area, and although yield data will not be available until 1960, the data obtained to date on leaf composition are very

interesting. These are summarized diagrammatically in Figure 8.

The diagrams show that during the early life of the plant conditions exist which preclude the adequate potash nutrition of cane, even in the presence of heavy applications of muriate of potash. Ratio between

dressings have been applied. The balance improves with cane age and heavy dressings of potash. It is especially bad on ratoon cane at 3 months of age. Taking the potash status by itself, whether plants or ratoons, but especially the latter, potash concentration in the leaf dry matter is entirely inadequate and

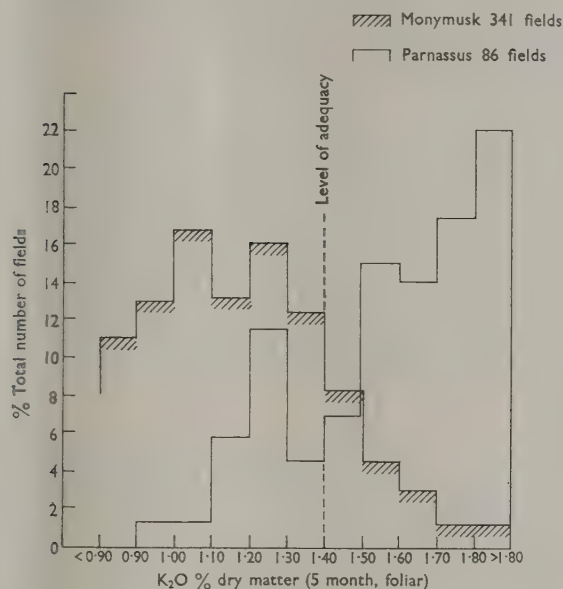


FIGURE 7

Distribution of fields according to K_2O level for two areas of similar soils

TABLE XI

THE POTASH CONTENT OF CRUSHER JUICE AND THE POTASH REMOVED IN THE MIXED JUICE OF CANE FROM THE DIFFERENT SECTIONS OF MONYMUSK COMPARED WITH THAT REMOVED BY CANE ON SOME OTHER SUGAR ESTATES

	P.p.m. K_2O in crusher juice	Lb. K_2O removed per acre	Lb. K_2O removed per ton cane
<i>Monymusk</i>			
Bog Section ..	3,070	210	5.65
Morelands Section ..	3,000	166	5.10
Springfield Section ..	2,400	126	4.63
Salt Savannah Section ..	3,160	178	5.75
Exeter Section ..	2,840	155	5.28
Greenwich Section ..	3,100	208	5.72
<i>Sevens Ltd.</i>			
Parnassus Section ..	1,370 to 3,040	155	4.16
<i>Caymanas</i>	2,660	173	4.38
<i>Frome</i>	1,180	86	2.28
<i>Long Pond</i>	1,020	57	1.83

nitrogen and potash is out of balance, particularly in ratoon cane, and even in plant cane, where no potash

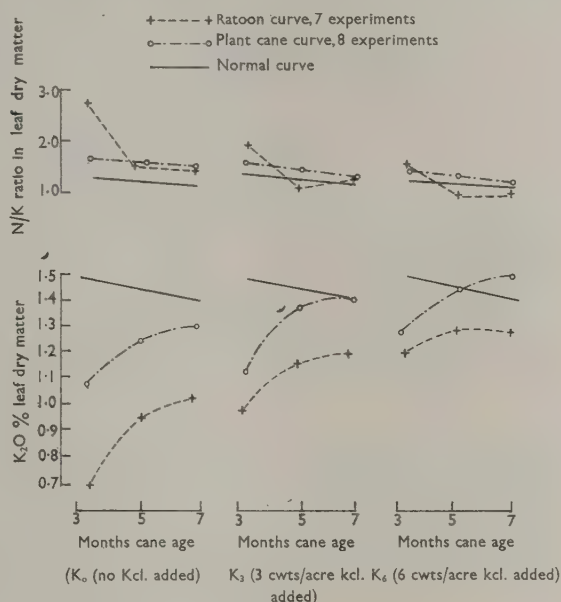


FIGURE 8

Behaviour of plant and ratoon canes on the clays of Exeter and Springfield

especially in young cane. Heavy dressings of muriate of potash bring about strong responses but it takes about 6 cwt. per acre of muriate of potash to bring about potash levels in the cane leaf tissue which approximate that of well-fed cane, and even this is not achieved with young cane. Two possible explanations are suspected. It is possible that there is considerable potash fixation, particularly affected by the state of hydration of the clays, or what seems probable from field examination of the soils, root systems during periods of frequent irrigation and/or rain are being restricted by the physical state of the soil, whilst the actual biological process of potash accumulation against a nutrient concentration gradient is limited by consideration of root aeration. The greater root system produced as the crop grows older may tend to correct matters, and when the soils are dried out prior to harvest, the temporary development of structure through shrinkage, and its consequent aeration of the root system, brings about a steep accumulation of potash in the plant, the physical size of which was limited by earlier soil conditions.

In order to examine quickly the likely impact of soil physical conditions on the growth and uptake of

potash by the plant, pot (one-half oil drums) studies were carried out using undisturbed field samples of soil (A); soil broken up and placed by horizons in the containers (B); and soil treated at (B) but also mixed with bagasse to prevent the quick repacking of the soil. The results are summarized in Table XII.

TABLE XII
MEAN DATA FROM POT STUDIES ON THE PLANT/SOIL
RELATIONSHIPS OF SOME MONYMSK SOILS

	Undis- turbed soil in its field state	Cultivated soil	Cultivated soil mixed with bagasse
Soil bulk density (relative)	100	84	78
Leaf weight (relative) ..	100	120	127
Root weight (relative) ..	100	147	160
K ₂ O % leaf dry matter ..	1.13 (100)	1.45 (128)	1.45 (128)

The very great effect of the physical condition of the soil on the behaviour of the plant, and especially

cultivation, nutrition and plant behaviour on some of the heavier soils.

Urea as a source of nitrogen

The results obtained from six ratoon experiments and one plant cane experiment reaped during the year suggest that urea as a source of nitrogen was somewhat inferior to sulphate of ammonia, the mean response to sulphate of ammonia having been 13% in cane and 12% in sugar greater than control, whilst equivalent urea dressings resulted in 11% and 10% increases respectively. On the experiments where the response to nitrogen was greatest, the response to urea compared to sulphate of ammonia was only 60% in cane and 80% in sugar. The general conclusion that urea was not as effective as an equivalent dressing of sulphate of ammonia was also confirmed by the results of experiments reaped in 1958. Three experiments were also reaped during the year in which commercial ureas of high and low biuret content were compared with sulphate of ammonia, and again the results failed to establish any significant deleterious effects from biuret at the levels encountered in the samples.

TABLE XIII
NUMBER AND DISTRIBUTION OF FORMAL, DISPERSED BLOCK AND OTHER NUTRITION EXPERIMENTS IN OPERATION—1959 CROP

	FALL PLANTS			SPRING PLANTS		RATOONS			Total
	Planted 1957	Planted 1958	Planted 1959	Planted 1958	Planted 1959				
	Reaped 1959	To be reaped 1960	To be reaped 1961	Reaped 1959	To be reaped 1960	Reaped 1959			
						1st	2nd	3rd	
Northern Division:									
Barnett	—	—	—	—	—	—	2	—	2
Hampden	—	—	—	—	5	—	—	—	5
Richmond/Llandovery ..	1	—	—	—	3	—	—	—	4
Rose Hall	—	—	—	—	2	—	1	—	3
Trelawny Estates	—	—	—	—	—	1	—	—	1
Central Division:									
Appleton	—	—	—	2	—	—	1	—	3
Frome	—	—	—	68	2	1	—	—	71
Holland	—	—	—	—	—	—	—	—	—
Monymusk	—	—	—	—	23	1	1	—	25
New Yarmouth	—	—	—	—	—	—	—	—	—
Sevens	—	—	—	—	12	—	—	1	13
Eastern Division:									
Bernard Lodge	1	—	—	—	1	—	—	—	2
Caymanas	—	—	—	—	1	4	—	—	5
Gray's Inn Central	—	—	—	—	2	—	—	—	2
Innswood	—	—	—	2	11	1	—	—	14
Jamaica Sugar Estates ..	—	—	—	—	—	1	—	—	1
Serge Island	—	—	—	—	—	—	—	—	—
United Estates	—	—	—	—	6	2	—	—	8
Worthy Park	—	—	—	—	—	1	—	—	1
Totals	2	—	—	72	68	12	5	1	160

on root development, and on the uptake of potash is evident. From these results it appears desirable to examine carefully in the field the full significance of

In all the experiments in question urea and sulphate of ammonia were placed on the soil surface at the base of the stools. The results could be explained by

urea being less stable as a chemical compound than sulphate of ammonia when placed in contact with the surface of soils. If this is so, the lower value per unit of urea compared with sulphate of ammonia should become accentuated in the presence of alkaline soils, and especially when the fertilizers are broadcast, either by hand or by aeroplane (because of the greater surface contact effects). *Estates should continue to use sulphate*

H. VARIETIES

Distribution

The percentage of the estate acreage occupied by B41227, B42231, and B4362 again increased in 1959; B41227 accounting for 38% and B4362 for 30% of the estate area, B37172 and B42231 declined slightly in importance, whilst Co421 showed no change and Co331 increased to a small extent. The other commercial

TABLE XIV

ACREAGE UNDER VARIETY % TOTAL ACREAGE REAPED 1955-59

Years	B3439	B34104	B37161	B37172	B41227	B42231	B4362	POJ2878	Co331	Co421	Others
1955	13	16	8	7	18	9	14	1	1	1	12
1956	9	11	7	7	24	10	18	1	2	1	10
1957	6	8	6	7	29	11	21	—	2	1	9
1958	4	4	4	6	34	11	25	—	2	1	9
1959	2	3	2	5	37	10	30	—	3	1	7

TABLE XV

ACREAGE UNDER VARIETY % TOTAL ACREAGE REAPED FOR ECOLOGICAL GROUPS—1958 AND 1959

Ecological groups	VARIETIES																			
	B3439		B34104		B37161		B37172		B41227		B42231		B4362		Co331		Co421		Others	
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
Wet West ..	—	—	5	1	4	1	2	1	45	46	2	2	37	44	—	—	—	—	5	4
Dry North ..	4	2	1	—	17	12	—	—	11	14	2	2	14	16	18	21	7	7	26	26
Irrigated ..	6	3	6	6	1	1	—	—	43	47	23	19	15	18	—	—	—	—	6	6
Wet East ..	5	3	—	—	1	1	89	34	7	11	1	2	35	41	—	—	—	—	12	8
Central ..	1	—	—	—	1	1	—	—	28	30	5	6	54	51	—	—	—	—	11	12
Average ..	4	2	4	3	4	2	6	5	34	37	11	10	25	30	2	3	1	1	9	7

TABLE XVI

PLANT ACREAGE UNDER VARIETY % TOTAL PLANT ACREAGE REAPED FOR ECOLOGICAL GROUPS—1958 AND 1959

Ecological groups	VARIETIES															
	B3439		B37161		B37172		B41227		B42231		B4362		Co331		Others	
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
Wet West ..	—	—	—	—	—	—	39	50	1	1	55	44	—	—	5	5
Dry North ..	—	—	7	1	—	—	18	30	3	1	24	20	31	24	17	24
Irrigated ..	2	1	—	—	—	—	54	40	20	20	15	28	—	—	9	11
Wet East ..	1	3	—	—	22	19	16	16	3	2	45	53	—	—	13	7
Central ..	—	—	—	2	—	—	38	30	5	8	51	43	—	—	6	17
Average ..	1	1	1	—	3	2	38	40	10	10	33	34	4	3	10	10

of ammonia until more information is obtained on urea, particularly on the volatility of its ammonia in the presence of our main soil types, and whether other methods of application can enhance its value when applied to the soil.

It is interesting to note that similar results have been recorded from Mauritius, even in the presence of acid soils.

Table XIII summarizes the number and distribution of all fertilizer trials operated during 1959.

varieties—B3439, B34104 and B37161 are now unimportant. However, because of its good juice quality there is a revival of interest in B3439 and it is being replanted on the irrigated estates.

In Figure 9 the changes in variety importance are illustrated, whilst the data for percentage acreage under the different varieties for the period 1955-59 are presented in Table XIV.

The distribution of the varieties in the various Estate groups is shown in Tables XV and XVI which present

the acreage under variety % total acreage and the plant acreage under variety % total Plant acreage, for the years 1958 and 1959. The information in these tables shows clearly the areas in which the minor

remained more or less unchanged; it is still grown mostly on the Irrigated Estates and is relatively unimportant elsewhere except for the Central Estates. The reliable juice quality of this variety will probably

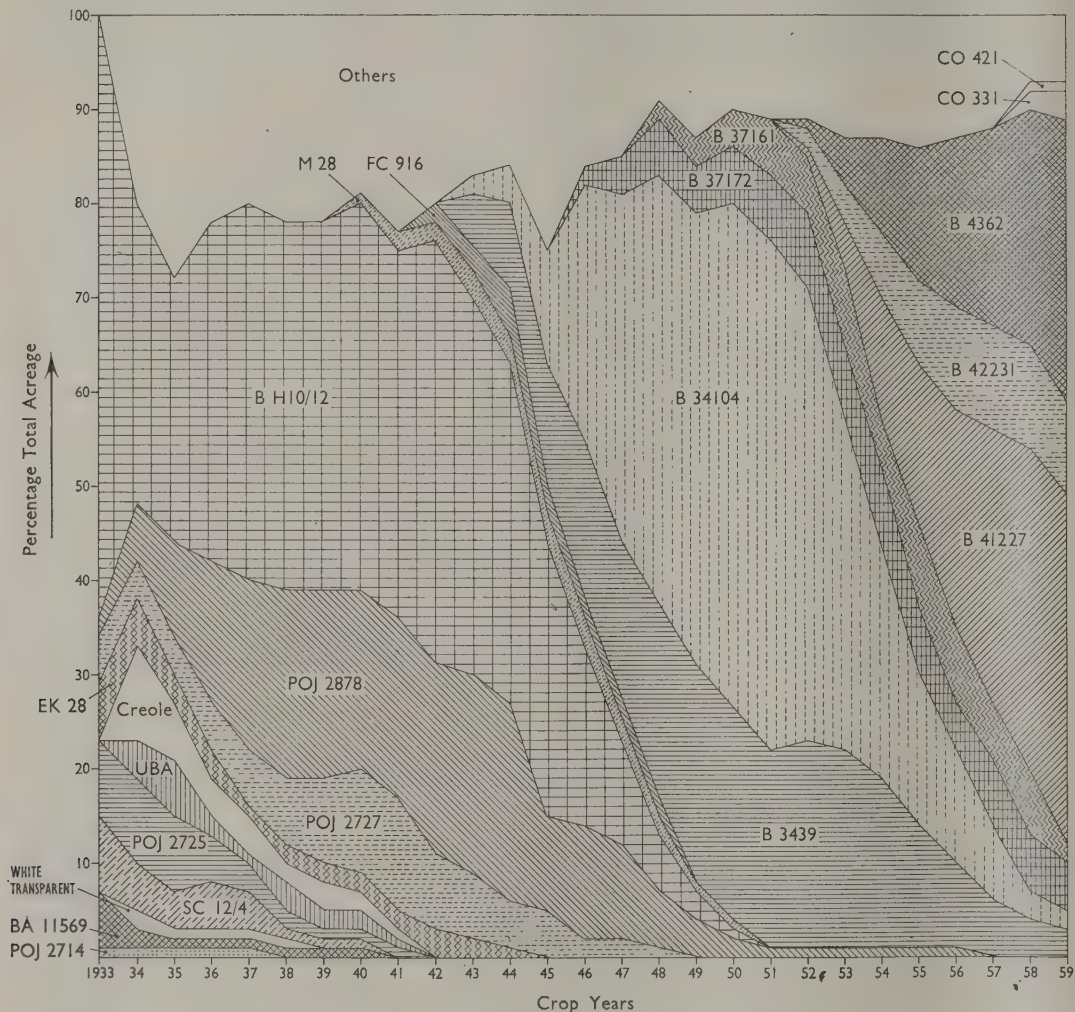


FIGURE 9

Percentage acreage under different varieties

varieties are of most importance and also suggests the current trends in the variety picture. For instance, B37172 is grown only on the wet East Estates and is losing ground to B4362; and Co331 and Co421 are confined to the North Coast Estates, where B41227 is being extended rapidly. The status of B42231 has

lead to its more widespread distribution. Generally, B41227 and B4362 dominate the situation as B41227 is the major variety on the Wet West, North Coast and Irrigated Estates, and B4362 leads on the Wet East and Central Estates. There are signs of a movement away from B41227 in favour of B4362 on Irrigated

Estates and the reverse on the Wet, Western Estates. The percentage acreage reaped in each cane class from 1957 to 1959 is given in Table XVII.

TABLE XVII
PERCENTAGE ACREAGE REAPED IN EACH CANE CLASS 1957-59

Years	CANE CLASSES					
	Fall plants	Spring plants	1st ratoons	2nd ratoons	3rd ratoons	Old canes
1957	3	10	16	20	18	33
1958	4	16	12	16	17	35
1959	8	14	18	11	13	36

The 8% of fall plants includes 4% of standover spring plants. Estates production is produced by 50% of its area being in 3rd ratoon or older.

good juice but did not compare with the standards in vigour.

(ii) *Final trials.* (a) *B47 series and B51 400's (1st 500's).* Two experiments were reaped as 3rd ratoons at Caymanas and Innswood. The results are tabulated in Appendix II. Overall B4362 outyielded the selections under trial. Unfortunately, neither B51410 (E162) nor B51415 (H444), which are the most promising two clones of this group, was included. B51410 has displayed considerable ratooning power and has done well on heavy land, and B51415 has produced good juice. These varieties have been planted on a field scale so that by next year an assessment may be made of their value as commercial canes.

(b) *B49', B50' and B52400 (2nd 500') series.* A total of seventeen of these experiments was reaped during

TABLE XVIII
CWT. THEORETICAL 96° SUGAR PER ACRE PER MONTH FOR VARIETIES BY ECOLOGICAL GROUPS—1959

Ecological groups	VARIETIES										
	B439	B34104	B37161	B37172	B41227	B44231	B4362	Co331	Co421	Others	Average
Wet West	5.81	2.55	5.06	5.61	5.81	6.19	6.37	4.88	—	5.27	5.97
Dry North	4.45	4.45	4.43	—	4.96	4.75	4.50	4.84	4.37	4.09	4.52
Irrigated	5.74	4.42	4.60	—	5.02	5.52	5.88	2.39	—	5.05	5.25
Wet East	5.23	5.48	6.08	6.08	5.96	5.26	5.82	—	—	5.38	5.85
Central	—	—	5.95	—	7.03	6.68	7.54	—	—	7.21	7.28
Average	5.47	4.18	4.64	6.05	5.40	5.57	6.12	4.79	4.37	4.92	5.54

Performance

The reason for the dominance of B4362 and B41227 is demonstrated in Table XII of Appendix I, which lists the performance of the different varieties for the different ecological areas. B37172 continues to give good results at Jamaica Sugar Estates, B42231 is outstanding at New Yarmouth and Co331 performs well on the shotty soils of Trelawny Estates. The performance of B41227 generally should be associated with the variety having been allocated the poorer than average soils.

The productivity of the varieties for 1959 is shown in Table XVIII in terms of cwt. sugar per acre per month.

Variety experiments

The number and distribution of variety experiments in operation during 1959 are given in Table XIX.

Results

(i) *Long season trials.* Two experiments were reaped as plants and two as ratoons during the year. The performance of the clones which did best is summarized in Table XX, which gives the order of merit. B42231 and H44/3098 were the most impressive varieties but from other trials the ratooning of H44/3098 is known to be disappointing. H38/2915 did well. NCo310 and H37/1933 did fairly well.

Some of the varieties—H32/1063, H37/1933, H39/3633 and H39/7028 were vigorous but produced poor juice, while others—H32/8560 and H39/5803 yielded

the crop as 1st ratoons. The order of merit of the varieties is given in Table XXI.

B49119 is easily the outstanding variety of this lot, and repeated its very good performance of last year. This variety is being extended on a field scale and so information on its commercial characteristics will soon be available. Its field behaviour is as follows:—

- (1) Very good germination and vigorous growth, thus giving good weed control.
- (2) Erect habit and profuse tillering.
- (3) Rather slender but long internodes.
- (4) Free shedding of trash.
- (5) Very slight susceptibility to mosaic; the leaves, however, are generally free of disease.
- (6) A juice quality slightly better than that of B41227 but not as good as B4362.

B49198, B50347 and H37/1933 were vigorous but produced poor juice whereas B49353 was lacking in vigour but gave fairly good juice. B5037 and NCo310 were only fairly vigorous but produced very good juice. The latter variety was notoriously erratic in yield; despite this it could be propagated on a very limited scale because of its rich juice. B49396 did quite well but is very thin-stalked and trashy. Of the remaining varieties B52407 did fairly well. The most disappointing feature about the varieties under test, excepting B49119, is their inconsistent behaviour.

(iii) *B51' and B51400 (3rd 500) series.* A group of eight of these trials was reaped as plants. The results

were not as reliable as we would desire; the standard errors of the experiments were very high. Despite this, it seems that both B5121 and B51131 may prove useful. The former displayed vigour comparable to that of B41227 and produced good sugar yields although its juice quality was only fairly good. The

latter selection was quite vigorous and rich in sucrose, so that on the whole its sugar production was good. This is a repetition of its record in the latter trials when it did very well as a plant but failed miserably as a ratoon. Because of its thick stalks, healthy appearance and very good juice quality, B51131 would

TABLE XIX
NUMBER AND DISTRIBUTION OF VARIETY EXPERIMENTS IN OPERATION DURING 1959

	FALL PLANTS			SPRING PLANTS		RATOONS			LONG SEASON TRIALS			Total
	Planted 1957	Planted 1958	Planted 1959	Planted 1958	Planted 1959				Reaped 1959	To be reaped		
	Reaped 1959	To be reaped 1960	To be reaped 1961	Reaped 1959	To be reaped 1960	Reaped 1959						
						1st	2nd	3rd	1959	1960	1961	
Northern Division:												
Barnett	-	-	-	1	-	1	-	-	-	-	-	2
Hampden	-	1	-	1	-	1	-	-	-	-	-	3
Richmond/Llandovery ..	-	-	-	-	1	3	-	-	1	-	1	6
Rose Hall	-	1	-	-	2	2	-	1	-	-	-	6
Trelawny Estates ..	2	-	-	-	2	6	-	-	1	-	-	11
Central Division:												
Appleton.. .. .	-	2	-	-	-	1	-	-	1	-	1	5
Frome	-	-	-	3	3	3	-	-	1	-	-	10
Holland	1	-	-	1	-	2	-	-	-	-	-	4
Monymusk	1	-	-	1	1	4	4	-	1	-	1	13
New Yarmouth	-	-	-	-	-	1	-	-	-	-	-	1
Sevens	1	-	-	1	-	1	-	-	1	-	1	5
Eastern Division:												
Bernard Lodge	-	-	-	1	1	2	-	-	-	-	-	4
Caymanas	1	-	-	1	-	2	1	-	-	-	1	6
Gray's Inn Central ..	-	-	-	-	-	1	-	-	-	-	-	1
Innswood	-	-	-	2	-	1	-	-	-	-	-	3
Jamaica Sugar Estates..	-	2	-	-	-	3	-	-	-	-	-	5
Serge Island	-	-	-	1	-	2	-	-	-	-	-	3
United Estates	-	-	-	1	-	3	-	-	-	-	-	4
Worthy Park	-	-	-	2	-	1	-	-	-	-	-	3
Totals	6	6	-	16	10	40	5	1	6	-	5	95

TABLE XX
SUMMARY OF LONG SEASON EXPERIMENT RESULTS
(order of merit)

VARIETIES	CANE				SUCROSE % JUICE				SUGAR			
	A	*B	C	D	A	B	C	D	A	B	C	D
B42231	2	2	1	3	2	1	-	3	3	3	-	3
H32/1063	1	2	-	3	-	-	-	3	1	-	-	3
H32/8560	-	-	-	2	2	-	-	2	-	-	-	2
H37/1933	2	3	-	4	-	-	-	4	2	1	-	4
H38/2915	2	2	-	3	1	2	-	3	2	2	-	3
H39/3633	2	2	1	3	-	-	-	3	1	2	-	3
H39/5803	-	-	-	2	2	-	-	2	-	-	-	2
H39/7028	1	1	1	2	-	-	-	2	1	1	-	2
H44/3098	3	3	1	3	2	2	-	3	3	3	1	3
NCo310	2	1	1	4	2	2	1	4	2	2	1	4

A = Number of times placed in first 5.

B = Number of times better than standard.

C = Number of times significantly better than standard.

D = Number of experiments in which planted.

* At Sevens (P) and at Appleton (1R) the standard was B4362; at Richmond/Llandovery (P) B37161 and at Caymanas (1R) B42231.

be a very attractive cane if it could be made to ratoon satisfactorily.

3/214 and 3/343 both did quite well and in addition to being quite vigorous they produced good juice. 3/311 and 3/84 also yielded fairly good juice but were not vigorous.

leading canes. The only other ones which showed up at all were B5126, 3/99 and 3/437. These three clones all produced good juice but were not very vigorous.

(b) B52' and B52400 (4th 500) series. The eight trials of this series were reaped as ratoons and the order of merit of the selections is listed in Table XXIII.

TABLE XXI
SUMMARY OF B49, B50 AND B52400's RESULTS
(order of merit)

VARIETIES	CANE				SUCROSE % JUICE				SUGAR			
	A	*B	C	D	A	B	C	D	A	B	C	D
B49119	15	16	6	17	9	8	3	17	14	14	7	17
B49198	7	8	3	17	—	2	—	17	3	3	1	17
B49352	1	1	1	14	4	6	2	14	1	2	—	14
B49396	7	9	2	17	11	11	2	17	8	7	2	17
B5037	5	6	2	16	12	10	3	16	5	6	1	16
B50347	8	9	1	13	1	4	1	13	5	9	1	13
B52405	5	7	2	16	6	10	—	16	5	5	1	16
B52407	9	10	2	15	7	5	1	15	8	5	1	15
B52409	6	7	1	14	5	3	1	14	4	4	—	14
H37/1933	7	8	3	12	2	4	1	12	6	5	1	12
NC0310	4	6	2	15	12	9	7	15	6	6	4	15

A = Number of times placed in first 5.

B = Number of times better than standard.

C = Number of times significantly better than standard.

D = Number of experiments in which planted.

* Standards = B41227 and B4362.

TABLE XXII
SUMMARY OF B51 AND B51400 RESULTS
(order of merit)

VARIETIES	CANE				SUCROSE % JUICE				SUGAR			
	A	B	C	D	A	B	C	D	A	B	C	D
B5121	5	4	—	6	3	2	—	5	4	3	—	5
B51131	4	3	2	8	4	5	1	7	4	3	3	7
B51134	4	3	2	8	—	1	—	7	3	2	1	7
B51129	3	5	1	8	1	2	—	7	2	2	1	7
B51374	3	4	—	8	1	1	—	7	1	3	1	7
3/21	2	3	1	8	1	1	—	7	1	2	—	7
3/84	1	3	—	3	1	2	—	2	2	2	1	2
3/206	1	3	1	5	1	1	—	4	1	2	1	4
3/214	1	1	1	2	2	2	—	2	1	2	1	2
3/311	2	2	—	7	3	1	—	6	2	2	—	6
3/343	3	3	1	4	2	3	1	3	3	3	1	3
3/377	3	2	—	7	1	1	—	6	—	1	—	7

Standards = B41227 and B4362.

3/21 and 3/206 did badly; B51134, B51259, B51374 and 3/377 were all vigorous but their juice was very low in sucrose.

The order of merit of the selections is given above in Table XXII.

(iv) *Lattice trials.* (a) B51' and B51400 (3rd 500) series. Two of these experiments were reaped as ratoons at Jamaica Sugar Estates and Monymusk. The varieties already tested in the last section were among the

B52315, B52389, 4/50 and 4/170 were fairly vigorous but produced very poor juice. 4/222 and 4/455 produced quite good juice but were lacking in vigour. B5235, B52257, B52321, 4/66 and 4/272 were fairly vigorous and yielded fairly good juice. B52107, 4/115 and 4/229 were quite vigorous and had fair quality juice. B52107 in particular did well on heavy land. 4/387 did quite well overall. However, B51129 and B52313 were the most promising varieties. The former

because of its high quality juice and the latter because of its vigour combined with fairly good juice.

The following varieties have been extended for further trial—B51129, B52107, B52313 and 4/115.

(c) *B53's and foreign varieties.* In all, six trials including these varieties were reaped as ratoons. The

a field scale at Monymusk the variety is being propagated for trial on other Irrigated Estates. H32/8560 is very vigorous on the nematode infested soils of Worthy Park and is being extended there. Because of its very good juice H39/5803 is being specially tried in poor ripening areas.

TABLE XXIII
SUMMARY OF B52's AND B52400's—RESULTS
(order of merit)

Varieties	CANE					SUCROSE % JUICE					SUGAR				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
B51129	1	1	5	1	7	5	5	5	—	6	3	4	4	1	6
B5235	1	1	4	1	3	2	3	2	—	7	2	3	5	1	7
B52107	2	5	5	4	8	—	2	2	—	7	3	5	4	3	7
B52257	1	4	3	3	8	1	4	4	—	7	—	2	2	1	7
B52313	4	7	6	4	8	3	4	4	—	7	4	6	5	3	7
B52315	2	2	5	2	8	—	—	—	—	7	1	2	4	1	7
B52321	—	1	3	2	8	—	—	2	—	7	1	2	3	1	7
B52389	2	3	3	2	8	—	—	—	—	7	—	1	1	1	7
4/50	2	3	3	1	8	—	1	1	—	7	2	4	2	1	7
4/66	1	2	3	3	6	1	3	2	—	6	1	3	3	2	6
4/115	3	7	5	5	7	—	3	2	—	6	3	6	5	2	6
4/170	2	3	6	4	8	—	—	1	—	7	1	2	3	1	7
4/222	1	1	3	1	8	3	4	3	—	7	1	2	3	1	7
4/229	3	6	5	3	8	—	4	4	—	7	1	4	4	2	7
4/272	1	2	3	2	7	1	2	3	—	6	1	2	2	2	6
4/387	2	3	4	2	8	2	4	4	—	7	2	3	3	1	7
4/455	—	1	2	2	8	3	5	5	—	7	1	1	2	1	7

Standards = B41227 and B4362.

TABLE XXIV
SUMMARY OF B53's AND FOREIGN VARIETIES—RESULTS
(order of merit)

Varieties	CANE					SUCROSE % JUICE					SUGAR				
	A	B	*C	D	E	A	B	C	D	E	A	B	C	D	E
B5352	3	4	4	1	6	—	2	2	—	5	2	3	4	2	5
B53218	3	4	3	2	6	3	3	4	1	5	3	4	4	2	5
B53267	2	2	4	—	6	—	2	4	—	5	1	2	2	1	5
B53348	2	4	3	—	6	4	4	5	1	5	4	4	3	2	5
D62/43	2	4	2	—	5	1	2	2	—	4	1	3	1	1	4
EROS	1	1	2	—	3	2	3	3	—	3	1	2	2	1	3
H32/8560	3	3	2	—	5	2	2	2	1	4	1	2	1	—	4
H38/2915	1	4	3	—	6	—	—	1	—	5	—	1	2	—	5
H39/3633	2	4	3	—	6	—	1	3	—	5	1	3	3	—	5
H39/5803	1	1	2	—	6	4	5	5	1	5	1	3	3	2	5
H44/3098	1	3	3	—	6	1	1	2	—	5	—	2	2	—	5
NCo339	2	3	2	—	5	2	3	3	1	4	3	3	3	2	4
PR100	1	1	1	—	1	1	1	1	—	1	1	1	1	—	1
PEPECUCA	1	1	2	—	5	3	4	3	2	4	1	1	2	—	4
PINDAR	—	1	1	—	3	3	3	3	2	3	1	2	1	1	3

* Standards = B41227 and B4362.

A = Number of times placed in first 5.
B = Number of times placed in first 10.
C = Number of times better than standard.
D = Number of times significantly better than standard.
E = Number of experiments in which planted.

leading clones were B53218, B53348 and NCo339. Unfortunately, the first variety is then stalked and arrows very freely, and the last is very thin. B53348 is being extended for planting in Final Trials and NCo339 is being propagated on the North Coast.

H44/3098 was very disappointing because it did so well as a plant in 1958. Although Eros did not impress generally it gave good results in trials at Monymusk and has been extended on that estate where it has grown very well. On the basis of its performance on

The order of merit of the selections is listed in Table XXIV.

(d) *BJ 54's.* The leading varieties in the five trials which were reaped this year were BJ5412, BJ5417 BJ5431, and BJ5462. The first two are the most promising, especially since BJ5412 did very well as a plant in 1958. Both of them are being multiplied for testing in Final Trials. The performance of BJ5417 was so good at Worthy Park that it has been extended on a trial field scale.

The order of merit of the selections is listed in Table XXV.

(e) *B54's, BJ54's, CP and Q varieties.* The summary of the results of the nine experiments of this series which were reaped this year is given in Table XXVI.

New experiments

The experiments planted during the year are as follows:—

Final trials

(i) One experiment at Richmond including B3439, B41227 and B4362.

(ii) Experiments at Monymusk and United Estates

in which B52107, B52313, B52315, B53348, BJ5412, 4/115, 4/387 and H44/3098 were planted.

Lattice trials

(i) *B53's, B54's, B55's, BJ56's and foreign varieties.* A series of eight lattice trials was laid out to test the following selections:—

B53's—Nos. 53, 77, 98, 184, 208, 255, 285, 293, 320, 375.

B54's—Nos. 11, 215.

B55's—Nos. 03, 57, 79, 99, 132, 137, 244, 250, 258, 309, 317, 362.

BJ56's—Nos. 12, 14, 15, 19, 29, 31, 38, 46, 48.

Others—Co313, Co360, Co413, H38/4443.

TABLE XXV
SUMMARY OF BJ54 RESULTS
(order of merit)

Varieties	CANE					SUCROSE % JUICE					SUGAR				
	A	B	*C	D	E	A	B	C	D	E	A	B	C	D	E
BJ5405	—	—	—	—	4	2	3	3	2	4	2	2	1	—	4
BJ5409	1	2	2	—	4	—	3	4	—	4	2	2	3	—	4
BJ5412	3	4	3	1	5	—	3	2	—	5	3	3	3	2	5
BJ5417	2	2	1	—	2	1	1	2	1	2	2	2	1	—	2
BJ5422	—	—	1	—	4	1	2	4	—	4	—	2	2	—	4
BJ5424	1	1	2	1	4	—	1	3	—	4	1	1	2	—	4
BJ5431	1	4	3	—	5	1	2	3	—	5	2	3	2	—	5
BJ5442	1	1	2	—	5	3	3	4	1	5	1	3	3	1	5
BJ5443	—	—	1	—	5	1	2	4	1	5	—	2	1	—	5
BJ5448	1	3	2	—	5	—	—	1	—	5	—	2	2	—	5
BJ5449	—	—	—	—	4	—	—	3	2	4	—	1	1	—	4
BJ5450	1	2	1	—	4	2	—	1	—	4	1	2	1	—	4
BJ5451	—	1	1	—	4	3	3	4	2	4	1	1	1	—	4
BJ5455	—	—	1	—	5	1	2	4	1	5	—	—	1	—	5
BJ5461	—	1	—	—	4	1	2	3	1	4	—	1	1	—	4
BJ5462	1	2	2	—	5	—	3	5	—	5	2	3	3	1	5
BJ5463	1	2	1	—	5	—	—	3	—	5	1	3	2	—	5

* Standards = B41227 and B4362.

A = Number of times placed in first 5.

B = Number of times placed in first 10.

C = Number of times better than standard.

D = Number of times significantly better than standard.

E = Number of experiments in which planted.

TABLE XXVI
SUMMARY OF B54's, BJ54's, CP AND Q VARIETIES
(order of merit)

Varieties	CANE					SUCROSE % JUICE					SUGAR				
	A	B	*C	D	E	A	B	C	D	E	A	B	C	D	E
B5277†	2	6	3	—	8	—	5	2	—	7	3	4	2	—	7
B5387†	5	6	1	1	8	4	6	5	—	8	6	7	3	1	8
B53200	1	3	1	1	9	1	5	4	—	9	1	5	1	—	9
B5401†	—	—	—	—	8	5	5	4	—	8	—	2	1	—	8
B5463	1	2	2	—	9	3	5	4	—	9	1	3	1	—	9
B5480†	1	2	2	—	9	5	8	4	1	9	3	3	3	—	9
B5490	—	2	1	—	9	2	6	4	—	9	1	5	1	—	9
B54142†	—	1	2	—	4	2	4	3	—	4	1	3	2	—	4
B54172	1	1	1	—	2	1	2	1	—	2	1	1	1	—	2
B54193†	4	4	2	—	9	1	1	1	—	9	1	4	1	—	9
B54262†	4	6	4	—	8	—	2	2	—	8	3	5	2	—	8
B54281	2	5	2	—	7	—	4	3	—	7	1	2	—	—	7
BJ5410	3	3	2	1	3	—	—	—	—	3	—	1	1	—	3
BJ5428	4	5	3	—	9	1	1	1	—	9	1	3	1	—	9
BJ5429†	4	7	3	1	8	2	3	3	—	8	2	5	2	—	8
CP34/120	1	1	1	—	4	1	1	1	1	4	2	2	1	—	4
CP36/105	2	2	1	1	6	1	1	1	—	6	1	2	1	—	6
CP36/11	2	6	1	—	9	1	1	1	—	9	2	3	2	—	9
CP44/101	—	1	—	—	3	1	1	1	—	2	1	1	—	—	2
Q47†	3	8	3	—	9	3	3	3	—	9	4	7	3	—	9
Q57†	—	—	1	—	9	4	6	4	1	9	—	3	2	—	9
B41227	4	5	—	—	8	1	2	—	—	8	3	5	—	—	8
B4362	5	6	—	—	9	5	8	—	—	9	6	8	—	—	9

* Standards = B41227 and B4362.

† Mosaic susceptible.

A = Number of times placed in first 5.

B = Number of times placed in first 10.

C = Number of times better than standard.

D = Number of times significantly better than standard.

E = Number of experiments in which planted.

TABLE XXVII

BJ60 SERIES (1957-58 SEEDLINGS) SELECTION DETAILS

Cross	PORTED				TRANSPLANTED				MOGAIC				SELECTED			
	S.	B.	Total	No.	B.L.	S.	B.	Total	Grand total	Nurseries			B.L.	S.	B.	Total
										B.L.	F.R.	Total				
Bal559	1	—	1	2	1	—	—	—	1	—	—	—	—	—	—	—
Bal560	4	—	4	3	1	—	—	—	2	—	—	—	—	—	—	—
Bal561	30	—	30	4	13	—	—	—	25	—	—	—	—	—	—	—
Bal562	784	—	784	104	331	—	—	—	648	—	—	—	—	—	—	—
Bal563	35	—	35	10	12	—	—	—	23	—	—	—	—	—	—	—
Bal564	115	—	115	50	24	—	—	—	82	—	—	—	—	—	—	—
Bal565	29	—	29	9	12	—	—	—	20	—	—	—	—	—	—	—
Bal566	381	—	381	54	167	—	—	—	312	—	—	—	—	—	—	—
Bal567	1,752	—	1,752	68	214	—	—	—	2,086	—	—	—	—	—	—	—
Bal568	349	—	349	129	46	—	—	—	384	—	—	—	—	—	—	—
Bal569	339	—	339	129	46	—	—	—	384	—	—	—	—	—	—	—
Bal570	1,800	—	1,800	21	304	—	—	—	2,439	—	—	—	—	—	—	—
Bal571	941	—	941	41	304	—	—	—	1,136	—	—	—	—	—	—	—
Bal572	266	—	266	171	40	—	—	—	76	—	—	—	—	—	—	—
Bal573	85	—	85	14	44	—	—	—	84	—	—	—	—	—	—	—
Bal574	14	—	14	1	6	—	—	—	13	—	—	—	—	—	—	—
Bal575	95	—	95	23	5	—	—	—	72	—	—	—	—	—	—	—
Bal576	1	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—
Bal577	839	—	839	9	401	—	—	—	805	—	—	—	—	—	—	—
Bal578	278	—	278	44	107	—	—	—	214	—	—	—	—	—	—	—
Bal579	3	—	3	—	—	—	—	—	1	—	—	—	—	—	—	—
Bal580	4	—	4	26	1	—	—	—	19	—	—	—	—	—	—	—
Bal581	141	—	141	5	68	—	—	—	135	—	—	—	—	—	—	—
Bal582	55	—	55	4	26	—	—	—	61	—	—	—	—	—	—	—
Bal583	522	—	522	164	122	—	—	—	344	—	—	—	—	—	—	—
Bal584	22	—	22	4	9	—	—	—	18	—	—	—	—	—	—	—
Bal585	13	—	13	5	4	—	—	—	1	—	—	—	—	—	—	—
Bal586	513	—	513	12	209	—	—	—	492	—	—	—	—	—	—	—
Bal587	25	—	25	4	10	—	—	—	21	—	—	—	—	—	—	—
Bal588	5	—	5	—	—	—	—	—	4	—	—	—	—	—	—	—
Bal589	186	—	186	13	80	—	—	—	164	—	—	—	—	—	—	—
Bal590	1,168	—	1,168	73	515	—	—	—	1,086	—	—	—	—	—	—	—
Bal591	879	—	879	30	400	—	—	—	832	—	—	—	—	—	—	—
Bal592	21	—	21	13	4	—	—	—	8	—	—	—	—	—	—	—
Bal593	136	—	136	7	65	—	—	—	133	—	—	—	—	—	—	—
Bal594	63	—	63	72	20	—	—	—	93	—	—	—	—	—	—	—
Bal595	68	—	68	11	23	—	—	—	42	—	—	—	—	—	—	—
Bal596	2	—	2	—	—	—	—	—	1	—	—	—	—	—	—	—
Bal597	1,200	—	1,200	5	257	—	—	—	1,176	—	—	—	—	—	—	—
Bal598	177	—	177	14	74	—	—	—	160	—	—	—	—	—	—	—
Bal599	140	—	140	19	79	—	—	—	133	—	—	—	—	—	—	—
Bal600	660	—	660	44	461	—	—	—	638	—	—	—	—	—	—	—
Bal601	277	—	277	20	129	—	—	—	266	—	—	—	—	—	—	—
Bal602	631	—	631	170	170	—	—	—	434	—	—	—	—	—	—	—
Bal603	3	—	3	—	—	—	—	—	3	—	—	—	—	—	—	—
Bal604	823	—	823	7	307	—	—	—	730	—	—	—	—	—	—	—
Bal605	17	—	17	4	6	—	—	—	13	—	—	—	—	—	—	—
Bal606	2	—	2	—	—	—	—	—	2	—	—	—	—	—	—	—
Bal607	44	—	44	14	14	—	—	—	37	—	—	—	—	—	—	—
Bal608	2	—	2	—	—	—	—	—	2	—	—	—	—	—	—	—
Bal609	130	—	130	21	45	—	—	—	88	—	—	—	—	—	—	—
Bal610	233	—	233	15	101	—	—	—	205	—	—	—	—	—	—	—

TABLE XXVII—continued

CROSS	POTTED			TRANSPLANTED				Mosaic				SELECTED											
	S.	B.	Total	No.	B.L.		F.R.		Total		Grand total	Nurseries		Grand total	%	B.L.		F.R.		Total	Grand total	%	
					S.	B.	S.	B.	S.	B.		B.L.	F.R.			Total	S.	B.	S.				B.	S.	B.
345990	121	—	121	44	—	—	56	77	77	—	77	2	5	7	51	43	2	—	—	—	2	2	3
x B4744	290	—	290	5	143	—	—	281	—	281	281	11	16	16	21	29	2	—	—	—	2	2	1
x O813	678	678	60	307	311	618	618	618	618	618	618	44	102	146	186	11	11	10	—	—	21	21	3
x B49119	5	—	5	—	3	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	5
x A49119	97	97	33	31	33	64	64	64	64	64	64	28	30	58	46	47	2	—	—	—	23	23	7
x B49119	596	596	237	120	150	313	313	313	313	313	313	3	10	13	29	12	11	—	—	—	—	—	—
x B48200	—	—	—	—	—	—	—	—	—	—	—	66	169	235	40	16	1	—	—	—	1	1	1
x A49119	2934	2,340	4,573	168	2,651	1,140	473	1,200	1,298	2,340	3,488	66	169	235	161	26	9	7	2	23	23	24	2
x B49377	523	523	179	382	178	2	—	—	565	—	563	52	52	19	20	93	—	—	—	—	1	1	3
x B4744	97	—	97	—	—	—	—	—	—	—	—	4	1	2	3	12	—	—	—	—	—	—	4
x B49388	613	613	89	261	283	544	544	544	544	544	544	7	48	55	134	20	12	12	—	24	24	24	4
x B47419	105	105	10	48	45	—	—	93	93	93	93	3	7	10	20	19	1	1	1	—	—	—	4
x B35011	54	54	12	19	20	39	39	39	39	39	39	3	7	10	20	41	1	—	—	—	1	1	3
x B52981	2	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
x B52981	584	584	58	264	359	77	267	352	—	—	582	14	36	50	108	18	3	3	—	6	6	6	1
x B5066	117	117	39	38	114	114	114	114	114	114	114	1	1	1	1	7	1	1	—	1	1	1	1
x B4938	117	117	39	38	114	114	114	114	114	114	114	7	19	26	65	55	1	1	1	1	1	1	2
x B4938	155	155	51	41	95	95	95	95	95	95	95	20	27	47	98	63	1	1	1	—	—	—	—
x B4938	89	89	29	28	28	56	56	56	56	56	56	3	16	19	48	54	—	—	—	—	—	—	—
x B4938	83	83	23	30	30	60	60	60	60	60	60	1	4	5	28	34	—	—	—	—	—	—	—
x B41211	52	52	3	24	44	15	—	—	—	—	—	2	5	5	28	34	—	—	—	—	—	—	—
x B4938	34	34	18	7	8	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
x B34104	6	6	15	5	286	754	754	754	754	754	754	161	184	345	504	53	5	5	5	5	5	5	1
x B41211	970	970	32	438	216	444	444	444	444	444	444	6	35	41	133	2	2	2	2	2	2	2	1
x B41211	379	379	59	151	161	302	302	302	302	302	302	14	17	31	90	24	5	5	5	5	5	5	1
x NC6310	663	663	14	350	284	634	634	634	634	634	634	28	31	59	73	11	21	6	6	6	6	6	4
x B4938	4	4	4	2	2	2	—	—	—	—	—	2	2	2	1	26	—	—	—	—	—	—	—
x B5411	111	111	4	53	53	53	53	53	53	53	53	2	1	1	6	18	—	—	—	14	32	32	4
x COMUS	1,001	1,001	70	460	483	913	913	913	913	913	913	3	12	25	68	10	—	—	—	32	32	32	2
x B41211	95	95	133	133	266	266	266	266	266	266	266	19	24	43	176	44	10	11	11	21	21	21	8
x B34104	406	406	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
x B4938	1,060	1,060	238	400	325	725	725	725	725	725	725	26	35	61	299	29	17	11	11	31	31	31	4
x B49119	220	220	35	88	85	173	173	173	173	173	173	10	14	34	59	27	1	1	1	—	—	—	—
x B50377	24	24	2	2	2	—	—	—	—	—	—	—	—	—	—	8	—	—	—	—	—	—	—
x B34104	11	11	9	1	1	1	1	1	1	1	1	—	—	—	2	2	1	1	1	1	1	1	9
x B4938	12	12	1	6	5	14	14	14	14	14	14	—	—	—	2	32	1	—	—	—	—	—	—
x B41211	395	395	174	93	96	184	184	184	184	184	184	24	31	55	229	59	2	2	2	1	1	1	1
x B52981	384	384	141	69	70	139	139	139	139	139	139	4	4	4	4	4	3	3	3	3	3	3	1
x B37193	1,825	1,825	3,119	70	625	920	685	900	1,210	1,820	3,030	17	40	57	6	10	18	1	1	10	28	30	2
x B4938	1,884	1,884	108	4	50	501	501	501	1,011	1,802	1,011	1	6	6	9	9	2	2	2	2	2	2	1
x B46151	2,448	2,448	110	1,078	894	1,097	1,008	1,008	2,175	1,902	2,077	21	47	98	178	6	19	2	10	22	22	22	8
x B49119	809	809	309	12	157	266	266	266	266	266	266	2	—	—	5	8	12	—	—	—	—	—	—
x B52988	248	248	66	19	2	186	186	186	335	—	315	45	79	134	219	55	8	10	18	18	18	18	6
x B34104	56	56	49	2	—	—	—	—	335	—	315	45	79	134	219	55	8	10	18	18	18	18	6
x B4938	1,293	1,293	414	386	379	765	765	765	765	765	765	53	94	147	56	4	2	2	4	4	4	4	1
x B46151	1,145	1,145	378	408	384	430	378	378	838	762	1,590	15	26	41	319	29	20	1	2	22	22	22	1
x B5387	6	6	3	—	—	—	—	—	2	2	2	1	1	1	4	67	—	—	—	—	—	—	—
x B4938	332	332	18	151	151	302	302	302	302	302	302	7	6	13	31	9	11	10	21	21	21	21	7
x CP39116	5	5	3	2	2	2	2	2	2	2	2	1	1	1	4	80	—	—	—	—	—	—	—
x B4938	132	132	60	34	31	65	31	31	65	65	65	—	—	—	66	50	1	—	—	—	—	—	1
x B41211	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
x B41211	33,600	11,699	45,299	5,049	13,624	5,720	12,553	5,608	24,207	11,228	37,435	1,073	2,020	3,093	8,142	24	395	14	238	1	632	15	647
TOTALS	33,600	11,699	45,299	5,049	13,624	5,720	12,553	5,608	24,207	11,228	37,435	1,073	2,020	3,093	8,142	24	395	14	238	1	632	15	647
TOTALS	33,600	11,699	45,299	5,049	13,624	5,720	12,553	5,608	24,207	11,228	37,435	1,073	2,020	3,093	8,142	24	395	14	238	1	632	15	647
TOTALS	33,600	11,699	45,299	5,049	13,624	5,720	12,553	5,608	24,207	11,228	37,435	1,073	2,020	3,093	8,142	24	395	14	238	1	632	15	647

Regional Propagation nurseries

Instead of planting Regional Propagation Nurseries as in previous years, only a Central Nursery was established at Caymanas. This was done because of the abnormal condition which was observed in B4362 on the Irrigated Estates where the new varieties were being grown; it might have been unwise to have distributed cuttings until the cause of the abnormality was determined. The clones which were extended are listed below:—

B54's—Nos. 07, 27, 37, 40, 74, 83, 113, 140, 224, 232, 272.

B56's—Nos. 60, 80, 95, 102.

BJ57's—Nos. 08, 09, 26, 27, 31, 33, 36, 38, 41, 42, 43, 46, 51, 52.

Foreign—Co678, Co775, P.R.980, Ragnar, Vesta.

In addition, a preliminary extension of the following Barbados B57 second year seedlings was made:—

Nos. 12, 36, 43, 87, 89, 91, 133, 141, 156, 176.

Pre-lattice selection programme

Quarter chain row nurseries

(a) B54's and BJ57's. One of these nurseries was reaped at Vale Royal and twelve B54's and BJ57's were selected for further testing. These have been extended at Caymanas. The other trials at Jamaica Sugar Estates and Monymusk will not be cut until 1960.

(b) B56's and BJ59's. Forty-three B56, and seventy-two BJ59 selections from the stage 2 nurseries reaped this year have been planted in stage 3 trials at Caymanas and Frome. The condition of the plots is generally very satisfactory.

Five stool nurseries (stage 2)

(a) B56 and BJ59's. As noted above the nurseries at Frome and Monymusk were reaped this year and forty-three B56 and seventy-two BJ59 varieties were selected.

(b) B57's. One hundred and eleven clones of this series were planted in nurseries at Bernard Lodge and Frome. The plotlet size was increased from 1 row $\times$ 1/8th chain to 2 rows $\times$ 1/8th chain. Germination and growth have been very good.

(c) BJ60's. A total of 637 varieties from the seedling nurseries at Bernard Lodge and Frome was selected. The details of selection are given in Table XXVII. These selections were treated similarly to the B57's and planted in plotlets of 2 rows $\times$ 1/8th chain.

Single-stool nurseries

(a) B58's. The 221 clones of this series were imported in October, 1958. All but the following nine germinated:—Nos. 59, 80, 86, 141, 152, 165, 175, 191 and 202. The seventy-four varieties listed below proved susceptible to mosaic after inoculation:—

Nos. 03, 07, 12-15, 24-28, 30-32, 37-39, 43, 44, 51, 65, 70, 76-79, 81, 85, 89, 91-94, 97, 99-101, 107-109, 112-120, 127, 129-132, 134, 138, 140,

144-146, 154, 164, 177, 182, 184, 196, 199, 201, 203, 205, 219, 220, 227, 230.

Of the remaining varieties 122 have been selected for planting in the stage 2 nurseries at Caymanas and Frome.

(b) BJ61's. The parentage of the 170 crosses received during the 1958-59 fuzz planting season and the details of germination are given in Table XXVII. The seedlings were shared between the Caymanas, Frome and Jamaica Sugar Estates nurseries as set out below.

Estates		Singles	Bunches
Caymanas	.. ..	7,008	775
Frome	.. ..	7,075	668
Jamaica Sugar Estates	..	7,556	—
		21,639	1,443 (= 11,796 singles)

New introductions

B59's. The 228 clones of this series were received in October, 1959, and all germinated. After inoculation sixty-two developed mosaic symptoms. The susceptible canes are:—

Nos. 26, 28, 30, 32, 36, 42, 49, 53, 55-57, 59, 61, 65, 67, 68, 71, 78, 80, 81, 88, 89, 93-97, 100, 102, 113-119, 128, 129, 135, 136, 138, 159, 164, 165, 173, 177, 185, 186, 190, 191, 206, 209, 231, 242, 244-246, 248-250, 259.

The mosaic free plants were set out in nurseries at Caymanas and Frome.

I. DISEASES AND PESTS

Nematode investigations

(a) Fumigation trials

Because soil parasitic nematodes were associated with adverse effects on cane growth in the Bullet Tree area of Worthy Park, small plot soil fumigant (nematocide) trials were laid down in plant cane fields during 1958, on most estates to ascertain whether responses could be obtained generally on sugar cane soils throughout Jamaica. The treatments included D.D. and another fumigant taken from the following:—Nemagon, ethylene dibromide and Fumazone—and a control plot replicated four times. The fumigants were applied with a Shell injector at a depth of 6 in. at 15-in. spacings in order to fumigate the top 13 to 14 in. of soil. Leaf weights were taken from each plot at 5 months and such trials as indicated possible responses were harvested and yield figures obtained. The results are given in Table XXIX. From this table it appears that at 5 months less than 5% of fields showed any response but that about twice as many fields responded significantly in yield of cane. These responses were almost exclusively from D.D. and Nemagon, both nematocides, with the D.D. responses being greater than the Nemagon responses. The responses, even when significant, were generally small.

(b) *The distribution of soil and root nematodes*

In conjunction with Dr. R. Latta of the International Co-operation Administration, a study of nematode distribution in the soils of cane lands was commenced. The variation in numbers and types of nematodes in soil and roots is given for some fields in Table XXX.

Nematode populations vary greatly from field to field but the two main species of parasitic nematodes found in the soil, namely, *Pratylenchus* and *Helicotylenchus* are remarkably constant, although the degree of parasitism of the two species varies considerably. As percentages of the total nematode population of the soil, *Pratylenchus* and *Helicotylenchus* are 18.19% and 11.21% respectively, but whereas *Pratylenchus* sp. represents 20.18% of the total nematode population of the cane roots, *Helicotylenchus* represents only 0.61% of the total. The parasitism of *Pratylenchus* compared with that of *Helicotylenchus* is therefore about 33 : 1 in sugar cane roots in the fields examined.

(c) *Nematocide/Insecticide trial (Worthy Park—Bullet Tree No. 1)*

First ratoon yields of this trial maintained the trends observed in the plant cane results but with a much reduced error. The effects of D.D. were outstandingly beneficial on both B41227 and B4362 although the control plots of both varieties showed a remarkable degree of recovery, and particularly B4362 with respect to B41227. The effects of chlordane still showed up beneficially in the 1st ratoons. The pre-planting treatments with D.D. or chlordane caused the plant cane to be so well established that the beneficial effects were evident in the 1st ratoons, but in the case of B4362 the ratoon yields were still below average.

(d) *Box studies with nematode infested soil*

Cane plants were grown in glass walled boxes filled with either nematode infested soil (from Worthy Park) or with similar soil, steam sterilized for 2 hours at one atmosphere pressure. The root weights developing in heat-treated soil were 3.5 times those in untreated soil, the difference being reflected in the growth and colour of the aerial parts of the plants. In the sterilised soil, although the numbers of nematodes separated from similar weights of roots were the same in each treatment, from the sterilized soil only 0.4% were parasitic, whereas in unsterilized soil these totalled 51.3%. As none of the nematodes recovered were cyst forming types, the low proportion of parasitic nematodes in heat-treated soil after 5.5 months agrees with the laboratory observation that they are much less slowly moving than the non-parasitic types; they are also more closely associated with the root tissues proper and therefore less likely to be leached with soil drainage water. The red discoloration of roots seen in fields which respond to fumigants, became evident on the young roots in the unsterilized boxes very early during their growth and developed until the discoloration was general. In the sterilized boxes this discoloration was largely absent and did not develop until late in the

life of the experiment. In neither case was any organism established as being associated with the discoloration.

(e) *The reinfestation of fumigated soil by nematodes*

An area of Bullet Tree No. 1 was heavily fumigated with D.D. at 40 gallons (U.S.) per acre and the soil checked for nematodes. Roots from stools in whole rows were removed and examined after intervals of time for nematodes, and an intensity gradient plotted for stools from the field division to the unfumigated area. No evidence was obtained of nematode migration from either the unfumigated area or from the field edge. The nematodes found subsequent to fumigation either migrated from the unfumigated subsoil or multiplied from the residue which escaped fumigation and were not detected by the earlier sampling methods. This confirms that fumigation, even if carried on an estate-wide basis, would not eradicate the nematode population.

(f) *Rotation of crops as a means of controlling nematodes*

At Worthy Park cane growth on fields planted from pasture is generally outstandingly superior to the yield on fields after many years in cane. An observation trial has therefore been laid out in which a small field has been planted to Pangola grass after many years in cane, in an area suspected to have suffered from nematode attack in the past. Parts of the field will be replanted to B4362 after increasing periods in grass. An examination of the grass roots has shown that small numbers of *Pratylenchus* sp. survive so that the rotation of cane with this grass may prove disappointing if the periods in grass are short.

Nematodes can have very severe effects on the establishment and growth of cane, especially in the plant cane crop, and the variety grown can exert a great influence on the severity of these effects. B4362 is particularly susceptible, whilst by comparison B41227 is much more resistant. The main effects of nematodes are the severe reduction of the developing root system, and in plant cane, the land being weed free, the cane roots bait the nematodes. A growth set back because of weather can effectively reduce the ability of cane to grow away from the pest and therefore may be an important factor influencing the results of an attack. The plant cane crop is the most critical period, after which the crop has a pronounced ability to grow away from the pest. Fumigants such as D.D. can have outstanding effects in badly infested areas but do not eliminate nematodes. The repopulation of treated soil arises from incomplete fumigation and not necessarily from lateral reinvasion.

West Indian cane-fly (*Saccharosydne saccharivora*)

The infestation of West Indian cane-fly observed at Monymusk in 1958 continued to build up till it reached epidemic proportions. In order to ascertain the extent of this infestation in Vere all large cane farmers' property in this area was surveyed for the incidence of the pest.

The infestation was least in the northern cane lands of Halse Hall and Sandy Gully. Spreading south and

TABLE XXVIII
BJ61's (1958-59 SEEDINGS)

Cross	Ported			Died			Mosaic			Caymanas			Frome			J.S.E.		Total	
	Singles	Bunches	Total	Singles	Bunches	Total	Singles	Bunches	Total	Singles	Bunches	Total	Singles	Bunches	Total	Singles	Bunches		
x B35276 ..	21	—	21	—	—	—	3	15	9	—	—	—	—	—	—	—	21	—	21
x B4543 ..	30	—	30	—	—	—	1	16	6	—	—	—	—	—	—	—	16	—	27
x B6569 ..	22	—	22	—	—	—	1	23	23	—	—	—	—	—	—	—	23	—	18
x B32107 ..	17	—	17	—	—	—	1	11	11	—	—	—	—	—	—	—	11	—	71
x B3321 ..	17	—	17	—	—	—	1	19	19	—	—	—	—	—	—	—	19	—	11
x B3321 ..	269	—	269	—	—	—	12	45	14	—	—	—	—	—	—	—	244	—	244
x CP36154 ..	45	—	45	—	—	—	3	9	9	—	—	—	—	—	—	—	43	—	43
x B4744 ..	11	—	11	—	—	—	1	11	11	—	—	—	—	—	—	—	10	—	10
x CP36154 ..	11	—	11	—	—	—	1	45	45	—	—	—	—	—	—	—	19	—	19
x B3439 ..	13	—	13	—	—	—	2	16	13	—	—	—	—	—	—	—	48	—	48
x B3539 ..	13	—	13	—	—	—	6	50	50	—	—	—	—	—	—	—	12	—	25
x B3539 ..	13	—	13	—	—	—	1	40	40	—	—	—	—	—	—	—	48	—	141
x B35207 ..	13	—	13	—	—	—	1	1	1	—	—	—	—	—	—	—	25	—	25
x B35207 ..	13	—	13	—	—	—	1	1	1	—	—	—	—	—	—	—	48	—	48
x D261 ..	47	—	47	—	—	—	1	1	1	—	—	—	—	—	—	—	3	—	3
x NC5330 ..	4	—	4	—	—	—	1	1	1	—	—	—	—	—	—	—	30	—	30
x B37161 ..	148	—	148	—	—	—	1	1	1	—	—	—	—	—	—	—	100	—	100
x B41211 ..	100	—	100	—	—	—	1	1	1	—	—	—	—	—	—	—	16	—	16
x B47398 ..	1	—	1	—	—	—	1	1	1	—	—	—	—	—	—	—	48	—	48
x B37161 ..	18	—	18	—	—	—	2	2	2	—	—	—	—	—	—	—	148	—	148
x CP28111 ..	171	—	171	—	—	—	1	1	1	—	—	—	—	—	—	—	100	—	100
x B37161 ..	2	—	2	—	—	—	1	1	1	—	—	—	—	—	—	—	16	—	16
x B37161 ..	55	—	55	—	—	—	—	—	—	—	—	—	—	—	—	—	171	—	171
x C6270 ..	13	—	13	—	—	—	—	—	—	—	—	—	—	—	—	—	55	—	55
x C6413 ..	13	—	13	—	—	—	2	23	23	—	—	—	—	—	—	—	2	—	2
x B37161 ..	402	—	402	—	—	—	11	11	11	—	—	—	—	—	—	—	16	—	16
x P3052AR ..	1	—	1	—	—	—	18	48	96	—	—	—	—	—	—	—	336	—	336
x B47268 ..	6	—	6	—	—	—	1	5	5	—	—	—	—	—	—	—	1	—	1
x B337172 ..	20	—	20	—	—	—	—	—	—	—	—	—	—	—	—	—	5	—	5
x B337172 ..	20	—	20	—	—	—	—	—	—	—	—	—	—	—	—	—	12	—	12
x B41227 ..	93	—	93	—	—	—	4	4	4	—	—	—	—	—	—	—	20	—	20
x B4096 ..	83	—	83	—	—	—	1	17	17	—	—	—	—	—	—	—	89	—	89
x B4096 ..	83	—	83	—	—	—	1	18	18	—	—	—	—	—	—	—	32	—	32
x B4744 ..	33	—	33	—	—	—	1	5	5	—	—	—	—	—	—	—	35	—	35
x B4744 ..	33	—	33	—	—	—	—	—	—	—	—	—	—	—	—	—	90	—	90
x B4214 ..	26	—	26	—	—	—	9	73	73	—	—	—	—	—	—	—	253	—	253
x B49119 ..	87	—	87	—	—	—	3	31	31	—	—	—	—	—	—	—	79	—	79
x B49119 ..	87	—	87	—	—	—	6	163	163	—	—	—	—	—	—	—	629	—	629
x B61242 ..	539	—	539	—	—	—	5	6	6	—	—	—	—	—	—	—	3	—	3
x B4214 ..	3	—	3	—	—	—	14	162	162	—	—	—	—	—	—	—	474	—	474
x Self ..	6	—	6	—	—	—	12	12	12	—	—	—	—	—	—	—	12	—	12
x B42231 ..	665	—	665	—	—	—	77	77	77	—	—	—	—	—	—	—	156	—	156
x B43380 ..	11	—	11	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
x B43380 ..	11	—	11	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
x B4681 ..	1,488	—	1,488	—	—	—	1,092	1,092	1,092	—	—	—	—	—	—	—	1,188	—	1,188
x B45151 ..	38	—	38	—	—	—	7	113	804	—	—	—	—	—	—	—	429	—	429
x B4744 ..	804	—	804	—	—	—	13	160	312	—	—	—	—	—	—	—	333	—	333
x B41227 ..	308	—	308	—	—	—	284	284	473	—	—	—	—	—	—	—	612	—	612
x B40982 ..	111	—	111	—	—	—	2	78	78	—	—	—	—	—	—	—	90	—	90
x B40982 ..	111	—	111	—	—	—	2	24	24	—	—	—	—	—	—	—	258	—	258
x B5121 ..	3	—	3	—	—	—	2	34	34	—	—	—	—	—	—	—	120	—	120
x B43214 ..	11	—	11	—	—	—	15	26	26	—	—	—	—	—	—	—	36	—	36
x C6270 ..	114	—	114	—	—	—	2	171	171	—	—	—	—	—	—	—	106	—	106
x C45152 ..	502	—	502	—	—	—	1	1	1	—	—	—	—	—	—	—	1	—	1
x B45170 ..	80	—	80	—	—	—	9	32	32	—	—	—	—	—	—	—	45	—	45
x B4744 ..	804	—	804	—	—	—	237	237	708	—	—	—	—	—	—	—	98	—	98
x B4744 ..	792	—	792	—	—	—	1	1	1	—	—	—	—	—	—	—	490	—	490
x B45225 ..	306	—	306	—	—	—	11	11	562	—	—	—	—	—	—	—	80	—	80
x B4098 ..	306	—	306	—	—	—	20	20	91	—	—	—	—	—	—	—	274	—	274
x B43806 ..	1	—	1	—	—	—	1	1	1	—	—	—	—	—	—	—	1	—	1
x B60135 ..	11	—	11	—	—	—	13	13	13	—	—	—	—	—	—	—	12	—	12
x B35012 ..	13	—	13	—	—	—	1	54	54	—	—	—	—	—	—	—	68	—	68
x B35012 ..	13	—	13	—	—	—	3	38	38	—	—	—	—	—	—	—	186	—	186
x B50941 ..	107	—	107	—	—	—	1	1	1	—	—	—	—	—	—	—	106	—	106
x B4142 ..	8	—	8	—	—	—	6	6	6	—	—	—	—	—	—	—	8	—	8
x B45151 ..	37	—	37	—	—	—	7	74	74	—	—	—	—	—	—	—	281	—	281
x B43229 ..	263	—	263	—	—	—	10	152	152	—	—	—	—	—	—	—	63	—	63
x B3370 ..	44	—	44	—	—	—	21	46	46	—	—	—	—	—	—	—	416	—	416
x B52371 ..	26	—	26	—	—	—	4	54	54	—	—	—	—	—	—	—	22	—	22
x B41227 ..	376	—	376	—	—	—	54	54	117	—	—	—	—	—	—	—	321	—	321
x B32107 ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE XXVIII—continued

Cross	Ported			Dried			Mosaic	Caymanas			Frome			J.S.E.		Subtotal		Total
	Singles	Bunches	Total	Singles	Bunches	Total		Singles	Bunches	Total	Singles	Bunches	Total	Singles	Bunches			
x B4098	157	167	7	7	—	—	1	54	48	54	48	48	48	150	5	—	150	
x B41237	6	6	—	—	—	—	—	6	—	6	—	—	—	6	6	—	6	
x B41298	6	6	—	—	—	—	—	60	66	336	66	288	90	216	468	—	684	
x B4098	600	1,088	384	384	—	—	—	265	330	265	330	330	90	90	249	—	925	
x B45151	939	2,925	26	26	—	—	—	69	90	69	90	228	66	168	691	—	991	
x B42866	76	76	—	—	—	—	—	235	228	235	228	228	66	168	599	—	599	
x B47320	76	76	—	—	—	—	—	26	66	26	66	240	48	108	444	—	599	
x B42421	168	781	9	9	—	—	—	59	252	311	12	12	12	12	3	—	599	
x D3459	552	1,044	442	394	48	—	—	4	—	4	—	—	—	4	4	—	552	
x D251	12	12	—	—	—	—	—	5	—	5	—	—	—	5	5	—	12	
x B49119	4	4	—	—	—	—	—	3	—	3	—	—	—	3	3	—	4	
x B4098	4	4	—	—	—	—	—	5	—	5	—	—	—	5	5	—	4	
x B4367819	4	4	—	—	—	—	—	14	14	14	12	12	—	26	6	—	26	
x B4367819	28	98	2	2	—	—	—	6	8	6	8	—	—	6	6	—	28	
x B47380	9	9	—	—	—	—	—	8	—	8	—	—	—	8	8	—	9	
x B37193	5	5	—	—	—	—	—	5	—	5	—	—	—	5	5	—	5	
x B47258	5	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	
x B47258	52	52	2	2	—	—	—	—	—	—	—	24	24	48	3	—	52	
x B47258	3	3	—	—	—	—	—	3	—	3	—	—	—	3	3	—	3	
x B47314	3	3	—	—	—	—	—	3	—	3	—	—	—	3	3	—	3	
x B47314	3	3	—	—	—	—	—	29	48	29	48	48	12	12	20	—	125	
x B47156	129	129	—	—	—	—	—	8	5	8	5	12	12	20	20	—	129	
x B47156	30	30	—	—	—	—	—	8	5	8	5	12	12	20	20	—	30	
x B31963	30	30	—	—	—	—	—	49	34	49	34	34	8	8	29	—	145	
x B41227	147	147	1	1	—	—	—	351	354	351	354	354	86	86	1,039	—	1,039	
x B41227	1,108	1,108	41	41	—	—	—	20	24	20	24	24	8	8	68	—	1,058	
x B47258	78	78	1	1	—	—	—	14	12	14	12	12	24	24	86	—	78	
x B46364	97	97	3	3	—	—	—	11	15	11	15	12	24	24	51	—	97	
x B49119	60	60	—	—	—	—	—	1	—	1	—	—	—	1	1	—	60	
x B51152	1	1	—	—	—	—	—	1	—	1	—	—	—	1	1	—	1	
x B52214	1	1	—	—	—	—	—	1	—	1	—	—	—	1	1	—	1	
x B370639	2	2	—	—	—	—	—	1	—	1	—	—	—	1	1	—	2	
x B370639	2	2	—	—	—	—	—	1	—	1	—	—	—	1	1	—	2	
x E241	8	8	—	—	—	—	—	8	—	8	—	—	—	8	8	—	8	
x D213	17	17	—	—	—	—	—	8	—	8	—	—	—	8	8	—	17	
x D1122	4	4	—	—	—	—	—	16	16	16	16	16	48	48	8	—	4	
x B41237	314	314	2	2	—	—	—	87	87	87	87	87	16	16	303	—	303	
x B41237	1,288	2,442	48	48	—	—	—	280	284	1,138	284	284	108	108	1,608	—	2,442	
x B41237	324	324	3	3	—	—	—	10	10	1,138	10	1,014	290	834	834	—	324	
x B41237	530	530	9	9	—	—	—	84	84	205	156	156	90	90	224	—	530	
x B41237	9	9	1	1	—	—	—	205	205	205	156	156	90	90	224	—	9	
x B41237	98	98	3	3	—	—	—	8	8	8	8	8	24	24	92	—	98	
x B41237	72	72	—	—	—	—	—	44	44	44	44	24	24	69	69	—	72	
x B41237	194	194	1	1	—	—	—	50	50	50	66	66	66	181	181	—	194	
x B41237	220	220	—	—	—	—	—	13	13	13	13	—	—	13	13	—	220	
x B41237	1,030	2,083	30	30	—	—	—	286	286	504	330	330	332	948	954	—	1,030	
x B41237	224	224	8	8	—	—	—	31	31	31	66	66	66	163	163	—	224	
x B41237	161	161	16	16	—	—	—	48	48	392	48	48	48	1316	1316	—	161	
x B41237	1,337	1,337	15	15	—	—	—	392	462	462	432	432	432	1,316	1,316	—	1,337	
x B41237	116	116	1	1	—	—	—	45	45	45	12	12	12	32	32	—	116	
x B41237	22	22	2	2	—	—	—	8	8	8	8	8	8	20	20	—	22	
x B41237	880	880	8	8	—	—	—	302	302	302	330	330	330	962	962	—	880	
x B41237	980	980	403	403	—	—	—	137	137	137	132	132	132	401	401	—	980	
x B41237	807	807	775	775	95	95	—	579	579	1,329	694	694	694	1,500	1,500	—	807	
x B41237	2,900	4,394	84	84	6	6	—	1,404	1,404	1,545	1,716	1,716	1,716	3,317	3,317	—	2,900	
x B41237	3,024	3,024	596	596	84	84	—	216	216	238	34	34	34	586	586	—	3,024	
x B41237	363	780	264	264	557	557	—	22	22	22	24	24	24	60	60	—	363	
x B41237	62	62	217	217	—	—	—	474	474	790	300	300	300	948	948	—	62	
x B41237	1,176	1,968	199	199	18	18	—	316	316	316	326	326	326	774	774	—	1,176	
x B41237	27	27	—	—	—	—	—	26	26	26	12	12	12	26	26	—	27	
x B41237	105	105	7	7	—	—	—	16	16	16	24	24	24	36	36	—	105	
x B41237	65	65	—	—	—	—	—	—	—	—	—	—	—	64	64	—	65	
Grand Total	27,535	19,498	40,133	5,352	750	6,102	444	7,008	6,402	13,410	7,275	5,346	12,621	21,839	11,748	33,587	27,535	

westwards Rowington, Ramble, Budleigh Park, Springhead, Robinson Bros.' property and Caswell Hill were all heavily infested. New Yarmouth also carried a fairly heavy infestation. The most heavily infested areas were further south on the West Indies Sugar Company's farms, on Paradise and on Ashley Hall. The isolated W.I.S. Co. holdings of Tarentum and Longville near Salt River also eventually developed infestations. In all, almost 20,000 acres were affected.

During 1958, at Monymusk infested fields were sprayed with malathion using motoblo equipment; the suggestion was made that a trial area be blanket-sprayed by aircraft. With the advent of the 1959 crop the reinfestation of sprayed ratoon sprouts from the

population can re-enter a field by the migration of adult cane-fly. Evidence was obtained that after spraying in March a high degree of parasitism was established by June, by *Anagrus* and *Stenocranophilus*, with *Zelus*, *Pseudogonatopus*, *Chrysopids* and *Syrphids* being present. Syrphids are active flies and will migrate back unaided rather quickly.

At Frome, the occurrence of cane-flies killed by three species of entomogenous fungi contrasted greatly with the scarcity of fungi at Monymusk. In the wetter areas, particularly during the wetter months, it is likely that fungi are important controlling agents. Adults and nymphs attacked by the fungus *Hirsutiella* were very common at Frome but were only rarely seen

TABLE XXIX
RESPONSES TO SOIL FUMIGANTS

Estates	Number of trials laid down	Number sampled	Number significant	Number reaped	Number significant
Appleton	3	3	—	1	—
Barnett	6	6	—	1	—
Bernard Lodge	4	4	—	4	2
Caymanas	7	5	—	2	—
Frome	16	16	1	15	2
Gray's Inn Central	2	2	—	1	—
Hampden	5	4	1	1	1
Holland	5	3	—	—	—
Innswood	4	3	—	2	—
Jamaica Sugar Estates	2	2	1	—	—
Monymusk	30	25	1	4	—
Ramble Farm	1	—	—	1	1
Rose Hall	4	4	—	1	—
Serge Island	8	8	—	2	1
Sevens	5	4	—	1	—
Trelawny Estates Ltd.	14	11	1	5	3
United Estates	7	6	—	2	—
Total	123	106	5	43	10

standing cane became so severe that widespread aerial blanket-spraying appeared to be the only effective way to regain control of the pest. With the help of Mr. Fred Bennett of the Commonwealth Institute of Biological Control the biological status of the pest and its parasites and predators was ascertained and a programme of aerial spraying recommended, as well as the continued use of manual motoblo spraying. Mr. Bennett revisited Jamaica from June to August to study the effects of this spraying with the following conclusions.

The balance between the pest and its natural enemies was interfered with by spraying. The practice was definitely detrimental to most of the beneficial species (and especially to *Pseudogonatopus*, *Anagrus armatus* and *Tetrastichus*), the possible exception being *Stenocranophilus*. The syrphids have a tolerant stage in their life history when spraying appears to have little effect and there is therefore little danger of this insect being eradicated by one or two sprayings. As *Stenocranophilus* depends on its host for migration, its

at Monymusk. Parasites and predators are the main means of control in the much drier Vere area.

The introduction of the parasite *Oligosita* sp. is recommended on the grounds that it occurs in Venezuela where natural control of the pest is very effective, but is absent in Jamaica, as well as the reintroduction of the Mirid *Cyrtorhinus mundulus* from Hawaii, an egg-predator credited with controlling *Perkinsiella saccharicida*. The egg-laying habits of *Perkinsiella* and *Saccharosydne* are similar so that *Cyrtorhinus* might be expected to be effective.

It was decided in February to spray aerially a block of 1,000 acres. This was done in mid-July when sufficient stocks of spraying material became available. In July, 400 to 500 acres were sprayed twice at an interval of 3 weeks between the applications. The spraying was extremely effective and a few days after the second spraying no adults or nymphs could be found and only the occasional egg-slit containing eggs laid after the first application. By November egg-slits and adults or nymphs could be found in every field in

TABLE XXX
(a) SOIL NEMATODES (number, type and distribution)

Name of Field	Total nematodes in sample (300 g.)	PARASITIC				NON-PARASITIC			
		<i>Helicotylenchus</i>	<i>Pratylenchus</i>	Various	Various	<i>Aphelenchoidids</i>	<i>Tylenchus</i>	<i>Dorylaimids</i>	<i>Saprozoics</i>
United Estates, Windsor Park, Worcester No. 10	7,347	50.83	14.33	—	—	3.17	—	1.83	29.83
Innswood, Gladstone No. 2 ..	2,130	10.91	24.15	—	—	5.72	—	24.33	34.88
Frome, Bluecastle Woolsey ..	2,557	2.40	17.19	—	—	8.87	2.40	8.32	60.81
Appleton, Raheen Dogharty	691	0.43	6.51	—	—	9.76	—	28.20	55.10
Barnett, Catherine Mount, Big Line	1,926	2.85	16.51	—	—	22.58	—	8.35	49.72
Caymanas, Phoenix Park, 11B	4,269	4.40	10.90	<i>Pratylenchus</i> 1.72	—	14.72	—	7.65	60.61
Caymanas, Dawkins McLean No. 3	5,517	6.59	25.05	0.38	<i>Haplo-laimus</i> 0.38 <i>Trichodorus</i> 0.75	8.29	12.62	10.17	35.78
Serge Island, Hall Head, Section 1	1,993	25.31	25.49	—	—	8.38	—	9.27	31.55
Serge Island	7,299	0.96	7.85	<i>Criconemoides</i> 0.38	<i>Haplo-laimus</i> 0.19	13.03	10.54	6.51	60.54
Rose Hall, Orange Valley, Big Salt Water	812	24.16	31.29	<i>Pratylenchus</i> 0.20	—	3.56	—	17.23	23.56
Rose Hall, Spring Top Triangle	2,818	4.15	22.08	—	—	6.98	7.36	6.42	53.02
Gray's Inn, Fort Stewart, Sterling Hill	912	2.43	13.62	—	—	12.50	9.89	7.84	53.73
Hampden, Gayles Valley Quarry	7,916	11.24	21.30	<i>Xiphinema</i> 2.76	<i>Rotylenchulus</i> 1.38	0.99	1.58	48.72	12.03
Richmond/Llandovery, Land Goat Piece	8,509	10.22	18.44	<i>Meloidogyne</i> 0.80	—	1.00	5.81	40.68	23.05
Mean	3906.86	11.21	18.19	<i>P</i> 0.16 <i>C</i> 0.03 <i>X</i> 0.20 <i>M</i> 0.06	<i>H</i> 0.04 <i>I</i> 0.05 <i>R</i> 0.10	8.54	3.59	16.11	41.73

(b) ROOT NEMATODES (types and % distribution)

Name of Field	% OF EACH TYPE REPRESENTED IN SAMPLE							
	Parasitic				Non-parasitic			
	<i>Helicotylenchus</i>	<i>Pratylenchus</i>	Various	Various	<i>Aphelenchoidids</i>	<i>Tylenchus</i>	<i>Dorylaimids</i>	<i>Saprozoics</i>
Appleton, Raheen Dogharty	0.37	38.65	—	—	22.16	—	10.26	28.57
Caymanas, Phoenix Park 11B	1.24	22.12	—	<i>Haplo-laimus</i> 7.08	33.10	—	3.54	32.92
Barnett, Catherine Mount Big Line ..	0.96	20.19	—	0.64	11.22	—	9.29	57.69
Serge Island, Hall Head, Section 1 ..	0.77	11.39	—	—	40.54	—	2.90	44.40
Serge Island	—	16.04	—	1.89	13.21	1.89	3.77	63.21
Gray's Inn, Fort Stewart, Sterling Hill ..	—	5.08	—	—	49.15	13.56	5.08	27.12
Caymanas, Dawkins McLean No. 3 ..	—	35.14	—	6.31	26.13	2.70	2.70	27.03
Richmond/Llandovery, Llandovery Great Piece	1.55	12.83	<i>Rotylenchus</i> 0.88	<i>Meloidogyne</i> 2.88	25.44	10.40	8.85	37.17
Mean	0.61	20.18	0.11	<i>H</i> 1.99 <i>M</i> 0.36	27.62	3.57	5.80	39.76

the area sprayed, but only at a very low, non-economic level as compared with other fields sprayed individually and only slightly higher than on an area which "escaped" infestation of any economic significance and which was not sprayed. By this time egg parasitism in the block-sprayed area had re-established itself at levels comparable with that in fields sprayed individually.

In the past 2 years natural enemies did not give adequate control and it became necessary to apply chemicals to protect the crop. The possibility of introducing additional species of parasites and predators of *Saccharosydne* or related Delphacids is recommended since it is possible that the application of chemicals may prolong an outbreak although, so far, there has been no definite evidence of this effect. "Should it prove necessary to continue spraying, the question of block-spraying rather than the spraying of individual fields should be considered, but always bearing in mind the possibilities of delaying the return of natural control as well as the upsetting of the biological control of other pests or potential pests. There is, unfortunately, no way of predicting these two factors, but investigations during the year have not given any reason to forecast any immediate unfavourable consequences. However, it is strongly recommended that the use of insecticides be restricted as much as possible. Having shown that adequate control can be achieved by spraying there may well be a growing tendency to utilize chemicals, whenever a very minor outbreak occurs, as a precautionary measure. Many of these outbreaks would clear up without any application of insecticides and in the long run the detrimental effects of spraying in the form of resistance and disturbance of host parasitic relationships of the pests could well outweigh the immediate benefits."

As a result of field surveys carried out at Monymusk a measure of the effects of cane-fly attack on the crop at harvest was obtained. In the case of B41227 on heavy soils, fields of heavy infestation were associated with lower quality cane, whether based on primary stalks, or on suckers, whilst on all soils heavy cane-fly attack was associated with reduced yields and fewer and lighter cane stalks. The effect on the weight of cane produced by B4362, whether on light or heavy soils, was not outstanding, but cane quality was adversely affected.

The effects of spraying with malathion to control cane-fly appear to have affected the incidence of Small Moth Borer (*Diatraea saccharalis*) beneficially. Twenty-two paired fields, one-half of which had been sprayed once or more with malathion, were compared with the remainder which had not been sprayed. The damage in sprayed fields was 50% of that in unsprayed fields. This observation, though encouraging, is tentative.

A sample survey of small moth borer damage (*Diatraea saccharalis*)

A check survey of damage caused by small moth borer larvae was carried out on six estates, to determine if the low incidence of this pest, as recorded in 1954, still continued. Estates from areas showing fairly high incidence in 1954 as well as those in low

incidence areas were chosen. The results are shown in Table XXXI.

TABLE XXXI
INCIDENCE OF SMALL MOTH BORER DAMAGE
ON SIX ESTATES IN 1954 AND 1959

Estates	% JOINTS BORED	
	1954	1959
Appleton	1.2	4.3
Caymanas	6.0	9.0
Richmond/Llandovery	1.9	10.0
Rose Hall	4.8	13.1
Serge Island	0.8	2.7
Trelawny Estates	3.4	7.7
Mean	3.02	7.80

The data suggest that the amount of damage caused by this pest may have increased considerably since 1954. This, however, may only be part of a normal fluctuation not recognized previously in Jamaica. The figures make it necessary to carry out a more extensive survey at an early date.

The survey also showed that nearly 10% of joints were affected by the red rot fungus *Phylospora tucumanensis*, 83% of which was due to infection through the tunnels made by the small moth borer caterpillars. Infection of this order results in an estimated loss of around £150,000 per year to the industry.

Lesser cornstalk borer (*Elasmopalpus lignosellus*)

During a visit by F. D. Bennett *Elasmopalpus* was recognized for the first time in Jamaica at Monymusk. The damage to the spindle leaves of young sprouts, resulting in "dead hearts," was seen at Richmond after trash had been burned from fields, leaving bare earth. The large area of cane burned at this last estate during crop showed this type of damage due to the lesser cornstalk borer and the small moth borer. The damage was particularly noticeable where one part of a field had been burned and the other not.

The following extract describing the insect and its damage is from *Destructive and Useful Insects*, by Metcalfe, Flint & Metcalfe.

"The insect hibernates in the larval, pupal or adult stages, but usually in the Southern United States as a larva, which transforms to a pupa before spring. The moths emerge from the pupae, or become active, early in the spring and lay their greenish-white eggs on the leaves or stem of the plants on which the larvae feed. The eggs hatch in about a week; the bluish-green, brown-striped caterpillars feed at first on the leaves or roots but later burrow into the stems of corn and other plants. They eat into the heart of the unfolding leaves of corn sometimes killing it. The larvae become full-grown in about 2 to 3 weeks. Their presence in the corn is indicated by masses of borings, which are pushed out through the holes in the stalk. The insects leave their burrows when full-grown and

spin silken cocoons under trash on the surface of the ground, in which they change to brownish pupae one-third inch long. From these the moths emerge in 2 to 3 weeks. They have a wing expanse of nearly one inch. The front wings are brownish-yellow with greyish margins with several dark spots. In the female the wings are nearly black.

Reasonable control of this insect in cane has been obtained in the U.S.A. by applying 1 to 1.5 lb. Endrin in 300 gallons of water per acre. Fields treated in this way showed one-third more live cane shoots than the untreated, although no increase in yield was found."

The affected areas of Richmond were not treated in

J. CHEMICAL LABORATORY

The laboratory was continuously engaged in the analysis of leaf samples of sugar cane, soils, export sugars, molasses, cane juice and other miscellaneous materials.

Table XXXII summarizes the distribution of laboratory analyses during the year.

K. FACTORY DATA

Factory and distillery weekly reports as well as final crop reports were received from all factories,

TABLE XXXII
LABORATORY ANALYSES UNDERTAKEN DURING 1959

1. LEAF MATERIAL								Total
N	P ₂ O ₅	K ₂ O	Ca	Mg	Trace elements	Others		
4310	3838	3969	61	93	175	459	13,905	
2. SOILS, FERTILIZERS								
pH	P ₂ O ₅	K ₂ O	Exchangeable base capacity		Ca	Mg	SiO ₂	
410	303	350	76		104	94	2	1,339
3. CANE JUICES, SUGARS, MOLASSES								
Brix	Pol	% Red Sugars	P ₂ O ₅	K ₂ O	Dry matter	Fibre		
1673	2253	58	551	551	29	75	5,190	
							19,434	

any way and recovered well. Any evidence of "hold-back" due to the damage caused by this insect soon disappeared. The pest is a serious one in Trinidad. It should be carefully watched when fields are burnt to accommodate mechanical cane loading.

"Third-leaf drying" condition

A leaf-drying condition was noticed at Rose Hall and Monymusk on the variety 3/311 in 1958. Subsequently it was seen on NCo310, Eros and B4362 at Monymusk, NCo310, B49119, B41227 and B42231 at Caymanas and on B4362 and B41227 at United Estates. Isolations from affected NCo310 at Caymanas were obtained by the Botany Department of the University College of the West Indies, the Department of Agriculture, as well as by this department and, as in 1958, no pathogenic organism was isolated. Attempts to transmit the condition by three different inoculation methods failed on B41227, B4362, B49119, NCo310, 3/311 and H37/1933 at Caymanas. The condition appears to be purely physiological, associated with rapid withdrawal of water from leaves, and resembles "leaf-burn" or "sunburn."

checked and circulated. A summary of factory performance together with comparisons of previous years' figures is given in the tables of Appendix III.

The year under review saw much investment in new factory equipment, both as replacement of and additional to installed equipment. Two factories installed new furnaces, and two installed new boilers; three factories changed some of their mill drives to turbine; two turbo-alternators were installed; auxiliary oil-firing equipment was installed by two factories and another two installed Edwards' accumulators on their mills; one installed a new juice scale and another a new Lea V-notch imbibition water recorder; two factories added boiler feed-water treatment plants; one added an extra cane-handling crane and one factory installed new multijet water condensers to their vacuum pans. In addition to the above numerous changes were made to installed equipment to improve throughput; whilst Frome doubled its milling plant by installing a new 15-roller turbine-driven tandem, in addition to three Babcock W.I.F. type boilers with bagasse carriers, extra juice weighing scale; Oliver filter, juice heater, two extra evaporator vessels and two extra vacuum pans; a battery of nine centrifugals;

a film cooling tower, a turbo-alternator, a diesel-alternator and a two-crane gantry. The full details are given in the appendix dealing with factory data.

L. LIVESTOCK SCHEME

(A) Introduction and Summary

1. Drs. Clay and Nestel visited the south-east of the United States in May in order to visit Agricultural Stations in Louisiana, Georgia and Florida and to purchase Charolais and Charbra cattle in these areas.

Following the above visit Dr. Clay went on to Puerto Rico in order to see pasture and animal breeding research in that island.

2. Alumina Jamaica had a very successful field day at Grier Park immediately following the annual appraisal of their Jamaica Red herd. This was attended by an appreciative gathering of farmers, including representatives of many sugar estates. During the course of the day a grazing trial and some pasture research work in progress at Grier Park were demonstrated by Dr. Nestel.

3. During the year the Livestock Division moved into the original administrative building when the new offices and laboratories were taken over by the Sugar Research Department.

4. Dr. Clay attended several meetings of the Livestock Policy Conference and sat on its sub-committee which reported under the Chairmanship of Mr. O. M. Clarke, on the economics of the Cattle Industry. (This Report will hereafter be referred to as the Clarke Report.)

5. Dr. Clay was appointed to sit with Sir Robert Kirkwood and the Director of Research on the Government Livestock Development Committee. This was one of several Commodity Development Committees appointed in September by the Minister of Agriculture to advise him on the development of various crops within the framework of the new Farm Development Scheme.

6. The long dry summer caused feed shortages on a number of estates and also retarded the germination and growth of much of the spring planting of pangola grass.

7. Fall army-worm caterpillars caused serious damage to grass in some parts of St. Catherine. This caused grazing problems at Innswood where two caterpillar attacks followed in quick succession before a spraying programme had been properly organized. Steps have since been taken to organize counter measures for the current year and it is hoped that neighbouring farmers will co-operate in instituting an aerial-spraying programme should the caterpillars reappear.

8. No important animal disease problems were encountered during the year and the "Pink-eye" Regulations were relaxed following the waning of that disease.

9. As in the first full year of the Livestock Scheme the major portion of the officers' work has been to act in an advisory capacity. Work has continued with formulating detailed development programmes and in assisting in designing pasture programmes and maps. Much of the preliminary work in this sphere has now been completed and accepted by managements.

10. Cost analysis studies were completed for both 1958 and 1959. These were designed to show the capital investment, operating costs, turnover and various efficiency factors on each of the estates studied. They demonstrated the magnitude of the investment of Scheme members (approximately £2.5 million) in the cattle industry and the negligible return from this investment. Methods of increasing output and reducing costs were studied on the participating estates. The data collected plus the data submitted to the Clarke committee were used as a basis for presenting a case to Government for decontrol of beef prices.

11. Miscellaneous growth studies have been carried out on a number of estates. These demonstrate how animal growth follows the same cyclic pattern as pasture growth with good spring and autumn gains separated by periods of poor growth. These naturally vary somewhat in different parts of the island, but generally speaking growth rates of grass-fattening steers cannot be considered adequate for much more than half of the year. Preliminary studies with the use of by-product feeds based upon molasses and also on the use of heavier applications of nitrogenous fertilizers suggest that these seasonal variations in stock growth can be avoided, although the economics of doing this require further study.

12. The studies of weaning weights of calves first carried out in 1958 were repeated in 1959 and involved a considerably larger number of animals. However, due to both a revision of analytical technique and to the urgency of obtaining and analysing the data on the economics of the beef industry, analyses of the weaning weight data was not completed during the year.

13. Studies were made of the dressing out percentages of butchered fatstock. Grass fed stock killed out at an average of 53.5 to 55.5% of their on-the-farm weight and lost about 60 lb. in transit to Kingston, where they usually killed at 58 to 60%.

14. Artificial insemination projects at Frome and Innswood have been planned for 1960. For the latter estate semen from Charolais and Brahman bulls was selected in the United States and flown down preserved in liquid nitrogen.

15. A series of hormone implantation experiments carried out on Alumina Jamaica's farms suggested that hexoestrol implantation 2 to 4 months prior to slaughter was an economic procedure in fattening steers. Results using progesterone and oestradiol implants were less satisfactory probably due to growth rates being too low for the hormone to have any effect.

16. The store cattle trial commenced in 1958 had a somewhat unsatisfactory termination and it was not

possible to analyse the results statistically. The impression was gained that growth rates on both participating estates, Caymanas and Worthy Park, were similar and unsatisfactory.

17. The use of tranquilizers at weaning time on steers intended for grass fattening was again shown to give no economic or statistical response.

18. A 12-month study on the economics of fertilizing pangola grass at Grier Park showed that the use of 3.5 cwt. of sulphate of ammonia plus 1.5 cwt. of muriate of potash increased the liveweight per acre production of pangola grass from 802 to 1,122 lb. Results on other estates showed the same trend and suggested that much heavier fertilizer applications, especially of nitrogen, are necessary in order to obtain the optimum usage of pangola. Returns from Worthy Park and from Frome suggest that some of the pangola on these estates has an annual liveweight per acre production in the region of 200 lb. and that very significant and economic responses follow split applications of nitrogenous fertilizer.

19. Studies were made on the yield and composition of fertilized and unfertilized pangola grass at Grier Park. Fertilized pastures yielded 40 tons wet and nearly 8 tons dry matter per acre during a 1-year period and unfertilized pastures produced 36 tons wet and 7 tons dry matter in the same time. 84 lb. applied nitrogen per acre produced a total increase of about 19% in the crude protein supplied by the grass in a 1-year period; this represented 71% utilization of the fertilizer nitrogen. In addition, there was an improved utilization of crude protein on the fertilized pastures and it is suggested that this was due to the protein percentages on these pastures rarely falling below 9%, which they frequently did on the unfertilized pastures. This concept is of considerable importance since the fertilized pastures produced 40% more lightweight per annum than their unfertilized partners and only 20% of this was a direct response to extra protein provided the other 20% resulted from improved protein utilization on the better pastures of the fertilized area.

20. A cheap feed consisting mainly of by-products of the sugar and citrus industries was used for fattening steers at United Estates. Over a 5-month period an average daily gain per steer of 1.30 lb. was obtained. In view of the cheapness of the feed this was considered promising but at present beef prices it would not be a worthwhile procedure. In any case, this daily gain was surpassed by steers on the same farm feeding on good quality pangola.

At Worthy Park weaners wintering on very poor quality pangola grass responded well to supplementary feeding with urea/molasses. Here again steers on good quality pasture surpassed the ones with supplemental feeding in terms of both weight gain and economic return.

It appears that supplemental feeding procedures need to be reassessed when pasture management is at a higher level.

21. Several nurseries have been established to study new legume, and grass introductions from Queensland

and Florida. *Centrosema* and Buffell grass from Queensland appear to be promising in the very wet and wet dry areas respectively.

22. Further work on the adaptation of imported bulls to the local environment has confirmed the advisability of pre-immunization at importation followed by planned treatment with newer drugs based upon serial blood examinations. The resultant greater degree of certainty as to which of the blood protozoa is concerned in the infection appears to have assisted in reducing the number of chronic infections, particularly at Worthy Park, where a species of *Babesia* hitherto unrecorded in Jamaica is believed to be important.

23. During the year four *Livestock Bulletins* were prepared; two of these recorded experimental studies carried out by the department and two were reviews of work in progress elsewhere.

24. The assistance and co-operation of all estates and Alumina Jamaica is gratefully recorded. We would also like to acknowledge our debt to our colleagues in the Sugar Research Department, particularly for their help in the chemical and statistical fields.

(B) General Observations

Renewed efforts have been made by beef producers in the island to press Government into improving the economics of beef production. Ever since the end of the war, during which controls on beef slaughtering and prices were imposed, there have been frequent negotiations on behalf of the industry towards the complete removal of controls.

Arising out of the meetings of the Livestock Policy Conference (1958-59) held at the Ministry of Agriculture, a sub-committee was appointed under the Chairmanship of Mr. O. M. Clarke to investigate the economics of the beef industry and to indicate a just price to be paid to the farmer for his beef. The findings and recommendations were based on the actual farm accounts of some twenty-one cattle farms. This was the first time any factual information of this nature had been collected for presentation to the Government since the Beasley Committee reported upon the economics of the industry in 1950.

Following on the presentation of the Clarke Report in September the Parliamentary Secretary to the Ministry of Agriculture and Lands appointed a Livestock Development Committee to investigate and make recommendations on all aspects of the livestock industry. Though some preliminary recommendations have been put forward from this committee, their findings will not be completed until some time in 1960. At the second meeting of this committee which was held in December, 1959, certain decisions were made which the representatives of the S.M.A. felt unable to accept and steps were taken for the Livestock Scheme members to be consulted about the submission of an independent memorandum to Government outlining the sugar estates' views on the future of the cattle industry.

In anticipation of some improvements arising from these conferences and discussions there has been steady progress made in pasture improvement work and general livestock expansion programmes on many estates. The establishment of new pangola-grass pastures has proceeded quite rapidly. Indeed, on a few estates there is relatively little scope for any further expansion in the acreage of this grass. Though on most estates establishment costs have been high, largely due to the difficult soil conditions encountered, these costs can fairly be regarded as capital outlay. The increased grazing obtained and the reduced pasture cleaning and maintenance costs relative to production should soon offset the high initial outlay. Nevertheless, in order to maintain the increased output from these pastures and at the same time to ensure their survival under heavier stocking conditions, sound fertilizer use coupled with careful grazing management require to be practised.

Results of the limited number of trials with fertilizers on pasture in Jamaica have indicated the great scope for increasing production by this means. However, a noticeable lack of information on the economics of fertilizer use under the widely varying pasture conditions of practical farming that occur in the island has been one of the main reasons why fertilizer methods have not been adopted. Economic assessment of production trials involving the use of fertilizers at Grove Place and Grier Park (see later) point to the favourable economics of moderate levels of fertilizer application. It remains for similar studies to be conducted in other localities where soil and climatic factors are different. At the same time the trials might with advantage be extended to cover considerably higher levels of nitrogen application than have been studied heretofore, in view of the particular ability of pangola grass to respond to fertilizer treatment.

There is still, however, much to be learnt with respect to practical fertilizer use in relation to droughts, differing soil types, frequency of application, etc., before the greatest advantages will be obtained.

The farm costings studies initiated on a few estates, and which it is hoped will be extended to others, have proved valuable in assessing the economics of various farming practices. Routine cost accounting will, it is felt, become more essential as management improves and production methods intensify.

The cattle-breeding policy adopted by most estates, is one of planned cross-breeding and it continues to show satisfactory progress. Though the programme is not sufficiently far advanced to make a full evaluation of it, the limited number of growth studies so far conducted point to the superiority of cross-bred animals generally. Particularly encouraging has been the performance of the Charolais crosses. They appear to be bearing out their good reputation for transmitting weight-gaining ability, and though originally imported on rather a trial basis it seems likely they will come to be an important breed for beef production in the island.

The small artificial insemination project which will be initiated in 1960, if successful, might indicate a relatively cheap and satisfactory means of producing

top quality commercial beef bulls from proven pedigree bulls either within the island or from other countries. This would overcome some of the difficulties associated with importation of high-priced pedigree bulls of unknown performance. However, it is unlikely that widespread use of artificial insemination for commercial beef cattle would become a practicable proposition.

The stock handling facilities have now been greatly improved on a number of estates and the use of spray races in place of dip tanks is becoming more general and is being found more satisfactory for tick control. Scales are now incorporated in many estate cattle pens and the regular weighing of stock while not only providing data for weaning-weight calculations is providing estates' personnel with a better appreciation of the weight-gain fluctuations occurring in their stock throughout the year and is also giving an understanding of the best times to market animals. There has developed a greater trade in weaned (9 to 12 months calves and a better price is being paid for this class of stock now that more is known about overall growth performance and rearing costs.

Advantage was taken of the large requirements of the members of the Scheme as a group to undertake bulk purchases of two items. In the latter part of 1958 phenothiazine was imported in bulk and in 1959 a large order was placed for metal field gates required for estates pasture subdivision programme. Savings of up to 50% of normal cost were effected thereby on both transactions.

(C) Stock numbers

The table (p. 41) shows the number and distribution of the different categories of stock within the Scheme. Though there has been an overall reduction in the total stock from 1958 to 1959 this has been entirely due to a decline in the numbers of working stock, both horsekind and working steers. There has been a rise of 3% in the number of commercial cattle (beef and dairy). In view of the fact that many estates have large pasture development and re-organization programmes under way, herd expansion has been restricted until these programmes have progressed sufficiently to permit greater stocking intensity. It is anticipated that the trend to mechanization in cane cultivation will continue with further reduction in the number of working stock. Provided that the anticipated improvements in the economics of beef production materialize, there is likely to be a fairly marked expansion in the estates commercial herds in the next few years as the benefits of the pasture improvement programmes now in progress are realized.

(D) Visit to U.S.A. and Puerto Rico

During May, Dr. Clay and Dr. Nestel made a short tour through parts of the Southern United States and Puerto Rico. The purpose of this visit was twofold. Firstly, it afforded an opportunity to visit several Government and University Agricultural Experiment Stations. Meetings were arranged with some of the leading workers on animal husbandry problems in tropical and subtropical climates. At the same time

many of the recent developments in this field were seen and discussed in the light of their possible application in Jamaica.

A second purpose of the trip was to visit some of the pedigree-cattle breeders in the region with a view to selecting breeding stock for the beef programmes of Frome and Trelawny Estates. As a result of the visits to some ten farms, four young bulls and three heifers of the Charolais and Charbra breeds were purchased by the above two estates. These animals

it firmly believed that these would be rapidly offset by the benefits to all livestock owners in the island.

(E) Cost analysis studies

The costing system designed by Mr. Morgan Rees, Agricultural Economist to the Ministry of Agriculture and Lands, was operated for the second year. For the financial year 1957-58 Caymanas, Innswood, Worthy Park and Barnett operated cost analyses of their pens. For the year 1958-59 Caymanas dropped out and

TABLE XXXIII
NUMBER AND DISTRIBUTION OF DIFFERENT CATEGORIES OF ANIMALS

Estates	Horsekind	Working steers	Bulls (young and Service)	Breeding cows	Young males C—3 y.o.	Young females C—4 y.o.	Fattening cows
Trelawny Estates	277	22	23	406	355	464	6
Frome	494	1,357	27	441	508	560	—
Serge Island	64	78	3	115	83	105	—
Appleton	73	23	1	27	24	13	—
Jamaica Sugar Estates ..	94	134	9	137	127	142	—
Gray's Inn Central ..	27	50	3	101	42	83	—
Richmond/Llandovery ..	78	—	4	89	69	90	—
Holland	37	10	6	179	209	171	—
Worthy Park	39	—	51	479	154	411	52
Caymanas	—	—	31	371	243	284	19
Hampden	—	—	4	114	120	137	10
Barnett	—	—	7	138	194	198	32
Rose Hall	40	—	2	50	24	46	—
Innswood	81	45	13	294	242	222	—
Monymusk	246	8	5	105	2	86	—
Sevens	63	2	3	74	49	58	—
United Estates	109	239	75	1,307	235	573	68
Alumina Jamaica	70	—	113	1,747	1,430	1,339	—
Total 1959	1,792	1,968	380	6,174	4,110	4,982	187 — 19,593
Total 1958	2,103	2,682	349	6,073	3,868	4,678	417 — 20,170

now appear to be acclimatizing well to conditions in their new environments.

A bulletin covering in some detail the points of interest and information gained on this tour was circulated to all estates in July.

Tick eradication—screw-worm control

One striking feature of cattle farming in South Florida and Puerto Rico, where conditions may be regarded as in many ways similar to those in Jamaica, was the immense benefit farmers had gained from the tick and screw-worm eradication programmes that had been carried out.

Recommendations based on these observations were put forward to the Ministry of Agriculture and to the Jamaica Livestock Association suggesting that investigations be started as soon as possible into the feasibility of eradication programmes being undertaken in Jamaica for either or both of these parasitic conditions. Though the costs of any such programme may appear high, it

Trelawny Estates and Alumina Jamaica participated. The first year's returns took some time to analyse and were not published until June, 1959. With the experience gained in compiling the first report the second year's figures were more rapidly analysed and are summarized here with the 1957-58 returns.

The studies have been carried out in four parts as follows:—

- (1) Capital Structure.
- (2) Operating Costs.
- (3) Output.
- (4) Efficiency Factors.

The capital structure of the beef industry

The marked variation in the topography of the estates studied made comparisons based upon acreages totally unrealistic, but it was found that if the investment capital was analysed in terms of the mean number

of stock on each farm then all farms had a similar capital investment per stock head.

TOTAL INVESTMENT PER STOCK HEAD

	1958	1959
In land	£70·6	£76·5
In fixtures	£17·6	£20·1
In stock	£35·1	£35·5
	£123·3	£132·1

There was a slight rise in the capital invested per head from 1958 to 1959. This was probably due to two estates, including one that was first costed in 1959 having very extensive development programmes which entailed the existence of new stock lands that were capitalized but understocked during 1959. The magnitude of the sample of farms studied can be gauged from the fact that in 1958 they carried 3,882 head on 6,997 acres and in 1959 8,418 head on 21,354 acres.

Operating costs

Operating costs were also compared on the basis of cost per stock head per annum. On this basis the major costs are itemized below.

TABLE XXXIV
OPERATING COSTS IN £ PER STOCK HEAD

	1958 £ per head	1959 £ per head	1958 % total	1959 % total
<i>Labour</i>				
Pasture cleaning ..	1·81	2·12	15	18
Fences and walls ..	0·97	0·79	8	7
Stockmen	1·22	1·68	10	14
Supervision	0·96	1·08	8	9
General	0·86	0·64	7	5
Sub-total	5·82	6·16	49	52
<i>General</i>				
Depreciation	1·62	1·25	14	10
Taxation		1·29		11
Administration } ..	1·97	1·66	17	13
Sub-total	3·60	4·09	31	34
<i>Miscellaneous</i>				
Tractor	1·00	0·67	8	5
Supplies	1·50	1·12	12	9
Sub-total	2·50	1·69	20	14
GRAND TOTAL ..	£11·92	£11·95	100%	100%

There was little change in the overall operating costs between the 2 years. Individual reports have been

sent to all participating estates suggesting improvements and economies based upon their comparative costings. On estates with a big acreage of hillside guinea-grass, pasture cleaning costs are a major problem. There appears to be too little spent on fertilizer and molasses and all estates have been advised to reconsider their policy with respect to these items.

Turnover

(a) Births

The calving percentage ranged from 50 to over 80. It appears that a calving percentage of about 85 and a weaning percentage of 80 are achievable if a high standard of management is practised. This necessitates units of about forty cows with one bull and a restricted breeding season also appears advantageous. Some of the unsurveyed estates within the Scheme have very poor calving rates and it appears that by improved management alone these estates could increase their output, in some cases by as much as 50%, for very little extra costs.

(b) Deaths

Death rates are about 2·5% and about half of these are in young calves whose group mortality is about 5%. Here again a management problem has been revealed and better attention to newly-born animals has markedly reduced the calf mortality for 1959 on some farms.

(c) Sales

Detailed analyses have been carried out of various sales factors according to the type of stock sold. This information is summarized below for 1958 and 1959 (1959 returns in brackets).

It will be seen that butcher stock made up most of the sales and averaged a little over £40 per head.

Efficiency factors

Studies have been made of gross and net outputs on both an acreage and on a stock-head basis. Profit and loss accounts reveal the importance of various factors, including labour on individual estates, and suggest how each farm might improve its situations. These factors are enumerated in detail in the two bulletins published on this subject.

The Clarke Report

The following table compares the returns which the Department analysed for the Clarke committee with similar returns from sugar estates. It reveals the

TABLE XXXV
SALES RETURNS

	Breeding stock	Butcher stock	Store stock	Working stock	Overall
% of various types sold ..	5 (7)	68 (66)	24 (21)	3 (7)	100%
% of income from sales ..	10 (21)	69 (63)	19 (10)	2 (6)	100%
Average price per head ..	£72·7	£41·5 (£40·9)	£32·3	£23·0	£40·6 (£43·6)

higher output of the sugar estates and also the very much higher operating costs that they have to contend with. To some extent this is due to higher labour rates but the proportion of labour costs to total costs is the same in both groups and the increased output of the sugar pens may be partially due to increased expenditure other than on labour.

It is interesting to note that Alumina Jamaica are somewhat intermediate between the sugar estates and the private pens in both input and output returns, and that the sugar estate with the lowest operating costs is making the smallest loss of all the sugar pens surveyed. On the other hand, the Clarke survey properties, considered overall, just made a profit although their average output was below that of any of the sugar estates.

It would therefore appear that in Jamaica low-input, low-output cattle farming is more profitable than modern methods of intensive, high-input pen-keeping. This is undoubtedly due to the anomaly of controlled prices, and if allowed to continue must discourage further investment in the cattle industry as must it also inhibit modern management practices.

TABLE XXXVI

A COMPARISON OF DATA FROM SUGAR AND PRIVATE PENS

	Clarke Report	Sugar pens, 1959
Number of cattle	20,556	8,418
Acreage in use	40,895	21,354
Total value of above (including fixtures) ..	£2,273,036	£1,112,018
<i>Operating Costs per Head</i>		
Labour	£3.1 (51%)	£6.16 (52%)
Management	£1.1 (18%)	£1.56 (13%)
Taxes	£0.5 (8%)	£1.29 (11%)
Materials	£0.7 (12%)	£1.12 (9%)
Miscellaneous	£0.7 (11%)	£1.82 (15%)
	£6.1	£11.95
<i>Gross Output per Head</i> ..	£6.4	£8.85
Profit or loss per head ..	+£0.3	-£3.10

(F) Animal growth studies

(a) Weaning weights

Weaning weights were recorded at Caymanas, Barnett, Innswood, Worthy Park and Trelawny Estates on a somewhat larger scale than last year. Analysis of the data was withheld pending some modifications in the presentation of results, and the statistical studies will not be completed until mid-1960. The 1958 returns were adjusted to a 7-month weaning weight, which is more closely indicative of the weaning age in the United States where most weaners are passed straight on to feed lots and not grass-fattened. For this reason we have considered adjusting weaning weights to a later age; by doing this we diminish the accuracy of the resultant figure as an indicator of the maternal ability of the dam. The weight adjusted to

8 or 9 months is both a reflection of the milking ability of the cow and also of the ability of the calf to do well after the milk supply has run low. At a younger age (6 months or less) we would lose a good deal of information as to the performance of the calf after the milk supply has diminished. This is of considerable importance where entirely grass-fed stock are concerned. There is a danger in carrying this extension of age too far in that it may necessitate weaning calves long before they reach the adjusted age and too much extrapolation at this time might lead to considerable errors. For these reasons we propose correcting our 1959 data to 240 days and where justifiable revising our 1958 data accordingly.

(b) Post-weaning growth

Post-weaning growth of steers has been studied at Worthy Park, Trelawny Estates, Caymanas and Alumina Jamaica. Under current systems of pasture management animal growth rates tend to closely follow pasture growth. The general pattern of animal and pasture growth tends to follow the curve in the graph below.

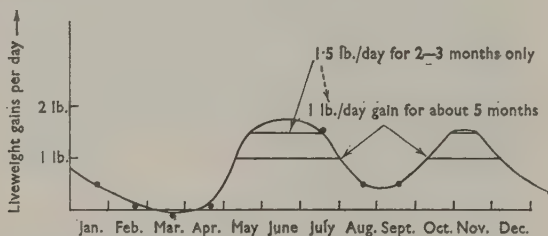


FIGURE 10

Probable pattern of stock growth on estates other than those at the extreme east or west of the island

The exact shape of the curves depends largely upon the rainfall distribution and in fact the graph shown was made on a low rainfall farm and tends to accentuate the severity of the dry periods. At Worthy Park the July-September drought appears more serious than the spring drought. At Alumina Jamaica (Grier Park) moderate fertilization of the pastures enabled an average animal production rate of over 3 lb. live-weight per acre per day (two steers gaining 1.5 lb. per day) to be maintained throughout the year, although during the spring rains a considerable amount of grass was wasted. On Trelawny Estates the response of fattening steers to implanted progesterone and oestradiol was directly related to the quality of pasture. It appeared that when the grazing conditions enabled the stock to gain weight at a rate of 1.5 or more lb. a day the implants gave a significant response, but at growth rates below the aforementioned figure the response was negligible or even negative if the grazing was very inferior. Therefore under existing conditions of pasture management the response to hormone is only economically significant from May to July. However, in view of the remarks made later under the

caption of "Fertilizer" these findings may require re-assessment if improved pasture husbandry is practised.

(c) Dressing percentages at slaughter

Studies have been made of dressing percentages in view of the widespread dissatisfaction with existing beef marketing laws whereby the price realized by a carcass is based upon its warm dressed weight. The distance of the principal abattoirs from many farms puts the producer in the invidious position of not usually being able to check the abattoir weights. Preliminary studies of on-the-farm weights at Barnett, Trelawny Estates and Alumina Jamaica showed that some fat-stock were reputed to average over 100 lb. loss per head between farm and clearing house. The producers were receiving dressing percentages of 57 to 60 and were unaware of any losses. Following very strong representations there were changes made in certain personnel at the butchering end and the very high intransit losses fell to somewhere in the region of 60 lb. or 6% of liveweight.

It now appears that grass-fattened steers usually kill out in the region of 53.5 to 55.5% of their on-the-farm weight or 58 to 62% of their starved liveweight. Unfinished animals and old cows will naturally give a somewhat lower return. As a safeguard where the producer is unable to attend at the abattoir, it appears advisable to weigh fatstock as they leave the farm and to place more reliance on the dressing percentage based upon farm weight than on that based upon liveweight at the abattoir.

(d) Influence of breeding on growth of steers

Jamaica Red and Jamaica Black steers were compared from the standpoint of growth rates and found not to differ significantly over a 5-month grazing period. Crossbreds of these breeds with Brahman's grew significantly faster than the pure types; these results are reported on in section (H) (hormone treatments).

(G) Artificial insemination

Though artificial insemination is carried out quite extensively in the dairy herds of the island very little has been attempted with beef cattle.

In 1957 twenty doses of Brahman semen were shipped to Jamaica from the Norris Cattle Company in Florida for distribution and use amongst the herds of members of the Jamaica Livestock Association. The difficulties associated with detecting animals on heat and getting the semen distributed long distances on short notice resulted in very little use being made of this semen. After nearly 2 years' storage in dry ice at Bodels the semen was offered for use at Innswood (St. Helen's). Eight heifers were inseminated early in the year but pregnancy diagnoses carried out 2 months later revealed that there were no conceptions. It had been feared that this would be the case as the viability of the semen on examination was poor.

Following the visit of Drs. Clay and Nestel to the Southern United States, arrangements were made to

import a trial shipment of Brahman and Charolais semen from the American Breeders Service in Wisconsin, U.S.A. Seventy-eight doses of Brahman and twenty-four of Charolais semen were obtained, shipped down in liquid nitrogen storage (-179°C.) and stored at the Government Artificial Insemination centre at Bodels. This semen is being used on selected animals from Worthy Park and Innswood which have been congregated at the latter estate to facilitate insemination from Bodels. The results from this trial will not be known until later in 1960.

In December, 1958, the West Indies Sugar Company, Frome, imported three Aberdeen Angus bulls from Scotland for use in their cross-breeding programme. In order to obtain fullest use of these animals arrangements are being made to collect semen from them for artificial insemination. This programme will be started in 1960 under Dr. Clacken's supervision.

(H) Hormone implantation

Further hormone implant experiments were conducted on fattening steers in 1959. These have been carried out on a somewhat larger scale than the preliminary trials undertaken last year.

(a) Experiment 1: Long's Wharf (Alumina Jamaica)

Using Jamaica Red and Jamaica Black type steers two implants were compared: (1) hexoestrol (60 mg.) and (2) implant "A"* (progesterone and oestradiol benzoate combined). There were nine and ten steers respectively in each of the two groups and these were paired with two groups of control steers according to weight. The animals were all grazed together on rather poor guinea-grass pastures.

The progesterone trial lasted 5.5 months (161 days) and the hexoestrol trial 4 months (118 days). The results are summarized in tables.

TABLE XXXVII
THE EFFECTS OF IMPLANTING STEERS WITH IMPLANT "A"

Item	Control group	Treated group
Number of steers in group	10	10
Average initial weight (lb.)	903	897
Average final weight (lb.)	1,063	1,084
Average total gain (lb.) 161 days ..	160	187
Average daily gain (lb.)	1.00	1.16
Average loss in transit to slaughter as % of final farm weight	2.7%	2.9%
Average warm dressed carcass weight (lb.)	576	573
Dressing percentage as % of farm weight	54.3%	52.8%

Though there was a slightly better liveweight gain and dressing percentage in favour of the treated and control groups respectively, these differences were not statistically significant.

* Synovex (Squibb).

TABLE XXXVIII

THE EFFECTS OF HEXOESTROL IMPLANTS ON FATTENING STEERS

Item	Control group	Treated group
Number of steers in group	9	9
Average initial weight (lb.)	990	982
Average final weight (lb.)	1,085	1,100
Average gain in 118 days (lb.)	95	118
Average daily gain per steer (lb.)	0.81	1.00
Average loss in transit to slaughter as % of final farm weight	7.6%	5.3%
Average warm dressed carcass weight (lb.)	578	591
Dressing percentage as % of final farm weight	53.3%	53.7%
Dressing percentage as % of initial farm weight	58.4%	60.3%

The weight gain of the treated animals was greater in this trial than in the progesterone trial, though again the difference was not statistically significant.

(b) *Experiment 2: Shooter's Hill (Alumina Jamaica)*

In this trial only the hexoestrol implant (60 mg.) was used. Twenty-two treated steers were paired for weight and type with twenty-two control steers and grazed with them on lightly fertilized pangola grass pasture. (One steer in the treated group had to be slaughtered soon after the trial started.)

THE EFFECT OF HEXOESTROL IMPLANTS ON FATTENING STEERS

Item	Control group	Treated group
Number of steers in group	22	21
Average initial weight (lb.)	826.3	823.1
Average final weight (lb.)	885.6	930.3
Average gain (95 days) (lb.)	59.3	107.2
Average daily gain (lb.)	0.62	1.13

As only seven steers were slaughtered from each group at the end of the 3-month period a full evaluation of the two groups through to carcass weight was not possible. Of those slaughtered at the end of the trial period, comparison between the treated and control animals revealed no significant differences in dressing percentages or intrasit losses. All steers were accepted as prime.

The difference in liveweight gain between the two groups was statistically significant at the 1% level. Evaluated economically, the gain per steer over the 3 months which was attributed to treatment was worth approximately £1 17s. 6d. net at current prime beef prices.

(c) *Experiment 3: Grier Park (Alumina Jamaica)*

Forty-two steers were selected from each of two pasture groups (fertilized and unfertilized pastures) and randomly divided according to weight and type into three groups of fourteen animals. One group was implanted with 60 mg. hexoestrol, the second lot were treated with pellets containing 200 mg. progesterone

and 20 mg oestradiol benzoate (implant "A") and the third lot acted as a control. The experiment lasted for the last 2 months out of a 4-month period during which the animals were being prepared for sale. Since the design of the experiment provided that the two steer lots (fertilized and unfertilized pastures) should be on the same level of nutrition, and a test of significance showed that this requirement was satisfied. The two replicates have been pooled in the following table.

TABLE XXXIX
EFFECT OF HORMONE IMPLANTS ON ANIMAL GAINS
OVER A 2-MONTH PERIOD

Item	Control	Implant "A"	Hexoestrol
Number of steers	28	28	28
Initial weight (lb.)	615.5	612	615.5
Final weight (lb.)	692.5	699.5	712
Daily gain (lb.)	1.38	1.56*	1.72†

* Significantly different from control at 5% level.

† Significantly different from control at 1% level.

In absolute terms the gains at the end of both 1 and 2 months are expressed in Table XL.

TABLE XL
ANIMAL GAINS ATTRIBUTED TO HORMONE TREATMENTS
AT THE END OF BOTH 1 AND 2 MONTHS

Item	Control	Hormone "A"	Hexoestrol
Number of steers	28	28	28
Average gain at end of 1 month (lb.)	62	66	75*
Average gain at end of 2 months (lb.)	77	88*	96†

* Significantly different from control at 5% level.

† Significantly different from control at 1% level.

Experience on other estates which tends to be confirmed here, is that hormone "A" is of limited value in animals whose weight gains are below the region of 1.5 lb. per day. To achieve a gain of this order requires either supplementary feeding or a somewhat lower pasture stocking rate than has been practised in the experiments described here.

(d) *Experiment 4: Grier Park (Alumina Jamaica)*

For this lot it was decided to do a straight comparison of hexoestrol treated versus control steers. In both pasture lots forty steers were paired for breed-type and weight and one member of each pair randomly selected and implanted with 60 mg. hexoestrol. The experiment lasted for 84 days.

In addition to studying the effects of hormone an analysis of variance was carried out for the effect of breed-type on liveweight gain. This is discussed in the next part of this report. Since, however, steers were paired according to type, and the analysis of

variance showed no interaction between breed-type and hormone treatment, we can consider first the hormone effects alone.

TABLE XLI
EFFECTS OF HORMONE IMPLANTS ON PASTURE
GAIN OVER A 3-MONTH PERIOD

Item	Control	Hexoestrol	Standard error	L.S.D.
Number of steers ..	40	40	—	—
Initial weight (lb.) ..	539.5	538	—	—
Final weight (lb.) ..	657.5	677	—	—
Daily gain (lb.) ..	1.40	1.65†	0.2408	0.109

TABLE XLII
ANIMAL GAINS IN LB.
ATTRIBUTED TO TREATMENT AT END OF EACH MONTH

Item	Control	Hexoestrol	Standard error	L.S.D.
End of 1st month (lb.) ..	46	55*	17.89	8.09
End of 2nd month (lb.) ..	90	105†	19.57	8.85
End of 3rd month (lb.) ..	118	139‡	20.23	9.13

* Significantly different from control at 5% level.

† Significantly different from control at 1% level.

‡ Significantly different from control at 0.1% level.

The gains in both experiments resulting from hormone implants were consistent with results reported by other workers in the U.S.A. and England.

It appears on this farm that there is an increased liveweight gain of 20% which can be attributed to hexoestrol implantation, and that this increase is obvious within 28 days of implantation and persists for at least 84 days. The response was statistically significant at the 5% level in 28 days, and at the 1% level in 56 days in both experiments. In the experiment that was continued for 84 days, the response to hexoestrol was significant at the 0.1% level at the end of this period.

Economics of implantation (Experiment 3 and 4 at Grier Park)

The average increase in weight attributed to the hexoestrol in twenty-eight steers implanted and

Hormone "A" gave a response of 11 lb. liveweight gain in 2 months. Although this was statistically significant, it did not quite cover the cost of the implants.

The effects of breeding on the weight gain of grazing steers

The farms producing steers for these grazing experiments have had breeding herds of Jamaica Red, Jamaica Black and cross-bred cows. Steers of all three types were included in the grazing trials although since the current policy is designed towards producing Reds and Red × Brahman crosses there was a restricted number of Blacks in the later lots.

Experiment A

The first study of the effect of breeding took place from August to December, 1958, when the pastures in this unit were first being fed. These pastures were not properly established and weight gains were not as good as the later trials. Fifteen Jamaica Red and fifteen Jamaica Black steers were paired and were grazed together as one lot for 154 days. The production data are summarized in Table XLIII.

TABLE XLIII
LIVEWEIGHT GAINS OF RED AND BLACK STEERS

Item	Red steers	Black steers
Number of steers ..	15	15
Mean initial weight (lb.) ..	471	472
Mean final weight (lb.) ..	648	646
Days on test ..	177	174
Days on test ..	154	154
Mean gain per day (lb.) ..	1.15	1.13

The difference in growth rates between the two lots was not significant.

Experiment B

In the steers used in hormone experiment 3 an opportunity was presented to carry out an analysis of

TABLE XLIV
THE EFFECT OF BREEDING ON THE RESPONSE TO IMPLANTED HORMONES

Item	Reds				Cross-breds			
	16	15	12	43	19	10	13	42
Number of steers ..	16	15	12	43	19	10	13	42
Initial weight (lb.) ..	569	547	543	554	568	558	551	561
Final weight (lb.) ..	706	691	700	699	720	729	723	724
Daily gain (lb.) ..	1.22	1.28	1.40	1.29	1.36	1.5	1.54	1.46

recorded for 2 months was 19.5 lb. In a second experiment forty implanted steers gained an average of 21 lb. more than their untreated counterparts in a period of 84 days. At present beef prices, these gains represent a profit of over 20s. per head over and above the cost of implantation.

variance for the effects of breeding and hormone treatments. The analysis was carried out on the 4-month gain whereas the hormones were only implanted mid-way through the experiment so that their effects are less significant than they are in the 2-month hormone comparison.

In absolute terms the average gains are as follows.

TABLE XLV
GAINS IN LB. ATTRIBUTED TO TREATMENTS

	Red	Cross-bred	Total
Control	137	152	145
Implant "A" ..	144	171	155
Hexoestrol ..	157	172	165
Average	145	163	154

Analysis of variance shows that the superior growth rate of the cross-breds is significant at nearly the 1% level. The response to hormone judged over the 4-month period is almost but not quite significant at the 5% level.

Experiment C

In the steers from hormone experiment 4 it was possible to simplify the analysis by the removal of the implant "A" group. The few pairs of Black steers were discarded and the analysis carried out on the remaining sixty-six head. Again the non-significance of the difference in growth rates of the two sets of steers eliminated variance due to fertilizer, and the two lots were pooled for analysis as in Table XLVI.

TABLE XLVI
EFFECTS OF BREEDING ON RESPONSE TO HEXOESTROL

	Reds		Cross-breds	
	Control	Hexoestrol	Control	Hexoestrol
Number of steers ..	16	16	17	17
Initial weight (lb.) ..	539	534	543	542
Final weight (lb.) ..	650	659	671	690
Gain per day (lb.) ..	1.32	1.49	1.52	1.76

In absolute terms gains were as follows.

TABLE XLVII
ANIMAL GAINS IN LB. LIVESTOCK FOR VARIOUS TREATMENTS
IN 84 DAYS

	Red	Cross-bred	Total
Control	111	128	119.5
Hexoestrol	125	148	136.5
Average	118	138	128

Statistical analysis shows that there has been a very highly significant response (significant at greater than 1,000 to 1) to cross-breeding and that the cross-bred steers gained about 20 lb. more over the 3-month grazing period. There is no evidence of any interaction between breeding and hormone treatment in either lot 2 or lot 3.

(I) Store cattle trial

This trial started in 1958 and was designed to yield information on the value of young store cattle relative

to their value when fat and ready for slaughter. It could not be concluded satisfactorily, due to a number of factors beyond the control of the estates concerned, and the trial was therefore abandoned.

There was no apparent improvement in growth performance of those steers transferred to the "lowland estate" (Caymanas) up to the time the trial was abandoned. Those steers remaining at the "upland estate" (Worthy Park) made approximately the same liveweight gain in an 18-month period.

(J) Tranquilizers

Repetition of the trials conducted in 1958 into the effect of tranquilizers on growth performance of beef calves at weaning indicated that there was no financial benefit to be gained from tranquilizer use at this time. In some cases there was a suggestion that the tranquilized calves adjusted to weaning rather quicker than the controls, but at the end of 1 month after weaning there was no significant difference in the post-weaning weight gain of the two groups. These results were identical in both European and Brahman stock as well as in their cross-breeds.

(K) Management of pastures

Because of the increasing acreage of pangola grass, its very high production potential and the fact that most of it is planted on accessible, cultivable land, we have to date confined our fertilizer work to this grass. This work has emphasized the very great nitrogen demands of this grass under heavily grazed conditions. Generally speaking, sugar estates' staff, accustomed to removing cane from off the field, were not appreciative of the fact that the grazing animal selectively removes nitrogen to a far greater degree than it takes off phosphorus or potash; it is estimated that about 90% of these latter two elements are returned to the soil as dung or urine. This in itself is raising a problem on the more intensively managed pastures in that the grass growing above and around excreta appears to be unpalatable and in time a clumpy rather than a uniform sward results. Success has been achieved in restoring uniformity of such pastures by the use of rotary grass cutters.

A great deal of Jamaican pasture land has a very low crude protein value. Although the crude protein content is not absolutely related to the grazing value of the grass, it is the simplest field assessment of pasture value. Generally speaking, growing stock require a dietary crude protein content of at least 9% for satisfactory growth. In Jamaica, where stock are usually fattened on grass, this crude protein has to come entirely from pasturage.

The protein content of a given grass will vary according to season, stage of growth, soil conditions, management and other factors. During the year several hundred grass samples were collected and analysed; most of these samples were of Pangola grass. The analytical results showed crude protein values varying from 3 to 19%. One consistent finding has been that, on some of the heavy clay soils common to

many sugar estates, pangola grass is generally comparatively low in its protein content in the absence of fertilizer treatment. Response in protein content at low levels of fertilizer nitrogen has been relatively small under these conditions, but heavier (84 lb. N.) applications have given promising results.

In contrast to this the same grass grown on free-draining terra-rossa soils has shown consistently higher crude protein contents which seldom fall much below a level of 10% of the dry matter during the first 2 years after establishment. Even with prolonged heavy grazing crude protein seldom seems to fall below 8% on these soils.

On the clay soils satisfactory drainage is an important factor. However, to produce and maintain good, free-draining conditions in heavy plastic clay soils is difficult and costly. An alternative method of maintaining a good protein content on such soils would be through the application of nitrogen at higher levels than are currently practised. At Worthy Park (see Section L) the application of 4 cwt. sulphate of ammonia plus 0.5 cwt. of potash and 1 cwt. superphosphate raised pangola pasture production in a 213-day period from 145 to 345 lb. liveweight per acre. Even at present beef prices this is profitable without considering the improved status of the fertilized pasture at the end of the experiment and its probable superiority to the control pasture in the months subsequent to the end of the trial. A similar result was obtained at Frome where the importance of split applications of nitrogen was very well demonstrated.

Although it is easy to demonstrate the increase in yield of their pasture or crude protein following the application of fertilizer, it is less easy to translate this into animal gains. The Grier Park trial reported on later gives some indication of the conversion rate of grass protein into animal protein. It now appears desirable to set up a number of trials to determine the response, on different estates, of pangola grass to applied nitrogen. The results of such trials in conjunction with a small series of animal production trials would enable fertilizer economics curves to be plotted.

Trace elements

An experiment was laid down on a heavy clay soil at Innswood (St. Helen's) to determine whether various fertilizers including trace elements would improve the growth of pangola. The experimental design was a 2⁵, treatments being:—

- (a) Lime—10 tons per acre.
- (b) 0.5 cwt. muriate of potash + 0.5 cwt. triple superphosphate per acre.
- (c) Sulphate of ammonia 1 cwt. per acre
- (d) Sodium nitrate 1 cwt. per acre
- (e) Trace elements Cu, Co, Mn, Mg and Fe.

There were no statistically significant responses to the lime or the potash/phosphate treatments. The responses in yield and protein content to the two nitrogen treatments were in accordance with the nitrogen responses noted on clay soils earlier, but there

was no significant difference attributed to nitrogen source. There was a small but non-significant response in herbage protein content attributed to the trace elements. This was not large enough to be of practical value.

(L) Studies on the productivity of pangola grass

From 1956 onward the Ministry of Agriculture have been carrying out a series of animal production trials on units of ten 1-acre pangola-grass blocks at Grove Place. Through the courtesy of Alumina Jamaica we have been able to carry out a production trial very similar to these. The results of the first year of this study are recorded below.

The average rainfall for the area is 60.79 in.; for the calendar year 1959 it was 60.92 in.; and for the experimental year March, 1959, to March, 1960, 61.19 in. Over half of this rainfall fell in the period October–December. The spring rains were conspicuously poor; two-thirds of the April to May rains were made up of two heavy showers, each of over 4 in. of rain. In addition to the rainfall the valley in which these experiments were carried out receives a heavy night dew.

Experimental methods

Jamaica Red, Jamaica Black and Crossbred steers were, after an adjusting period on pangola, weighed on to the grazing trial and thereafter weighed every month. They were allocated on to fertilized and unfertilized pastures in a random fashion. The two sets of pastures, fertilized and unfertilized, were stocked at a rate designed to enable steers grazing them to gain about 40 lb. per month or 1.4 lb. per day. This set stocking was designed to enable both sets of steers to have the same plane of nutrition and to avoid the effects of under or overgrazed pastures distorting the grazing returns.

Fertilized pastures received 1 cwt. muriate of potash per acre in November and 1 cwt. sulphate of ammonia in November, May and August.

Three steer lots were used; during the year each lot was sold as stores at the end of its experimental period.

Results

The unit was grazed for 325 days out of 364. The carrying capacity of the fertilized pastures averaged over the whole year 2.20 head per acre. The unfertilized pastures carried an average of 1.5 head per acre. Production data for each of three lots of steers are indicated in Table XLVIII.

Extra production from fertilized pastures is 320 lb., i.e. a gain of 40%. A graph of the weight gains month by month showed that these gains were put on steadily throughout the year and were not distorted by using three instead of one lot of steers.

The economics of fertilization

The extra return attributed to fertilizer of 320 lb. liveweight has to be offset against the cost of the

treatment, which in 1959 was £6 ls. 2d. per acre, and will be about £5 per acre at 1960 costs. The value of this increase is given in Table XLIX.

- (a) Prime beef dressing 54% on the farm and realizing 210s. per 100 lb. w.d.w.

whose gross output averages a little over £4 per acre was involved. In fact, a large acreage of relatively poor land is required to supply animals for this productive area and it is not suggested that the average pen could have an overall gross output of the level tabulated

TABLE XLVIII
PRODUCTION DATA FOR EACH OF THREE LOTS OF STEERS

Period	Days	Pasture treatment	Total liveweight gain per acre during period	Gain per head per day
1959				
March-July	129	{ Fertilized Not fertilized	448 lb. 342 lb.	1.38 lb. 1.47 lb.
July-Nov.	112	{ Fertilized Not fertilized	386 lb. 270 lb.	1.47 lb. 1.37 lb.
1960				
Jan.-March	84	{ Fertilized Not fertilized	288 lb. 190 lb.	1.46 lb. 1.53 lb.
Total gain: Fertilized ..			1,122 lb.	
Not fertilized ..			802 lb.	

- (b) Control beef dressing 54% on the farm and realizing 145s. per 100 lb. w.d.w.
(c) Store cattle at £6 per 100 lb. liveweight.
(d) Store cattle at £5 per 100 lb. liveweight.

TABLE XLIX
RETURNS FROM FERTILIZATION

Market	Value of 320 lb. liveweight	Per acre fertilizer costs	Per acre profit from fertilizer
	£ s. d.	£ s. d.	£ s. d.
Prime	18 2 10	6 1 2	12 1 8
Control	12 10 6	6 1 2	6 9 4
Stores at £5 ..	19 4 0	6 1 2	13 2 10
Stores at £6 ..	16 0 0	6 1 2	9 18 10

Thus in all four markets at existing prices fertilization can increase returns by at least twice the cost of the fertilizer.

Gross output from pangola

The gross output per acre for the fertilized pastures calculated on the basis of a gain of 1,122 lb. liveweight per acre is equivalent in the various markets to the following sums:—

	£ s. d.
Prime beef	63 12 0
Control beef	43 18 0
Stores at £5	56 0 0
Stores at £6	67 8 0

These data require very careful interpretation. The gross output per acre of twenty-one farms surveyed by the Clarke Report was £3 3s. per acre and on the sugar estates that are cost analysed it is £4 4s. On the particular farm on which this trial was carried out approximately one-eightieth of the land area of a farm

above. Nevertheless, where good land is used for stock farming there is reason to suggest that its productivity under cattle can compare favourably with that from cultivated crops. It is therefore of the greatest economic importance to manage good land properly.

The production of grass—wet matter

The average grass production per feeding was about 4 tons of wet matter per acre except for the two spring grazings when production averaged about 8 tons wet matter per acre. Fertilized pastures averaged 40.09 tons grass per acre per annum and their unfertilized partners averaged 35.80 tons per acre per annum.

Dry matter production

The oven-dried dry matter content of the grass ranged from 10.8% in lush rain-wet grass in August, to 34.5% in dry stemmy seeding grass in July. The average dry matter content was 19.05%.

The actual yields for five-paired fertilized and unfertilized pastures are recorded in Table L.

TABLE L
TOTAL DRY MATTER YIELDS FROM FERTILIZED AND UNFERTILIZED PASTURE

Fertilized pasture	Yield in lb. D.M. per annum	Unfertilized pasture	Yield in lb. D.M. per annum
No.		No.	
Group A 1	14,558	10	14,529
9	17,613	2	17,053
3	16,343	8	15,236
7	18,280	4	15,023
5	16,938	6	16,395
Mean ..	16,746	Mean ..	15,647

Examination of the individual analyses reveals that except in the spring the dry matter per acre per feed was of the order of 1,600 lb. The spring grazings produced about double the usual dry matter which makes the total yield about 16,000 lb. D.M. per acre per year. This is equivalent to over 7 tons of concentrate feed on a dry matter basis.

The total dry matter available to the steers is tabulated below against the corresponding liveweight gain per acre.

TABLE LI
DRY MATTER UTILIZATION

	Fertilized pastures	Unfertilized pastures
	lb.	lb.
Total dry matter provided during year	293,103	333,972
Total liveweight gain	22,380	18,825
Lb. D.M. available per lb. liveweight gain	13.09	17.74

There is a big difference in the efficiency with which the grass was utilized as demonstrated by the weight of grass required to produce 1 lb. of liveweight in the stock on the two sets of pastures.

The seasonal variation in productivity (in terms of dry matter per acre per day) is plotted graphically in Figure 11.

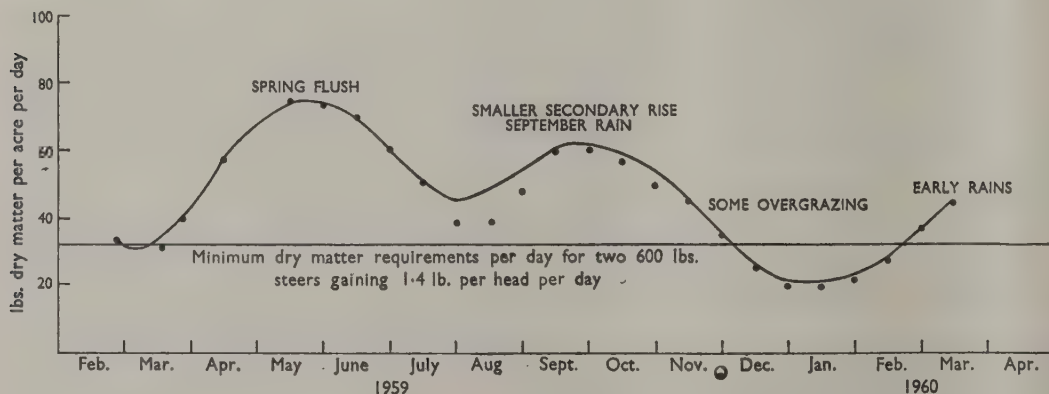


FIGURE 11

Seasonal production of dry matter

Production rises sharply through March and April from about 30 lb. per day to a peak of about 75 lb. per day in May. A fairly sharp decline then follows and during the dry month of August production is down to about 40 lb. per day. The September and October rains then caused a sharp secondary rise to 60 lb. per day, which fell gradually to about 20 lb. in January. The slowness of the decline may perhaps have been due to very good November and December

rains, and the magnitude of the decline might be partially due to over-grazing in November.

Although the production of dry matter per day fell below that necessary to maintain two steers per acre in January, the rest which the unit had in December enabled sufficient pasture reserves to be built up to maintain weight gains on the fertilized pastures which were stocked at over two head per acre during January.

The production and utilization of crude protein

The total yields of crude protein for five pairs of pasture are recorded in the following table:—

TABLE LII
TOTAL CRUDE PROTEIN YIELDS FOR FERTILIZED AND UNFERTILIZED PASTURES

Fertilized pastures No.	Lb. crude protein per acre per annum	Unfertilized pastures No.	Lb. crude protein per acre per annum
1	1,982	10	1,491
9	2,066	2	1,869
3	1,975	8	1,683
7	2,067	4	1,714
5	2,429	6	2,112
Mean ..	2,104	Mean ..	1,774

The difference between means is 330 lb., which is 18.6% of the untreated mean and is significant at the 5% level. It represents 71.2% utilization of the nitrogen applied as fertilizer and follows the same pattern of nitrogen utilization as has been reported from Florida (see Figure 12).

The total crude protein available to the steers is tabulated below against the corresponding liveweight gain over the year.

TABLE LIII
THE RATIO OF PASTURE CRUDE PROTEIN TO LIVESTOCK
GAIN ON FERTILIZED AND UNFERTILIZED PASTURE

	Fertilized	Unfertilized
	lb.	lb.
Total crude protein provided ..	34,108	33,914
Total liveweight gain during year	22,380	18,825
Ratio	1.52	1.80

Levels of crude protein

It has been seen earlier that considerably more protein was used per lb. liveweight gain in the unfertilized pastures than in the fertilized pastures. Thus it is possible that the efficiency of protein utilization was greater on the fertilized pastures. It has recently been shown in ruminants that within certain limits protein utilization is more efficient at higher levels of protein supply than it is at lower levels. Duckworth has estimated the protein requirements of tropical forages to be in the range 8 to 11% for stock to grow at the rate indicated in this experiment. The U.S. National Academy of Sciences recommend a minimum crude protein figure of 9.3% for beef cattle of 600 lb. gaining 1.4 lb. per day. However, in the absence of

In the pastures studied the mean crude protein of the unfertilized pastures averaged 10.7%, and that of the fertilized pastures 12.2%. Thus the latter group

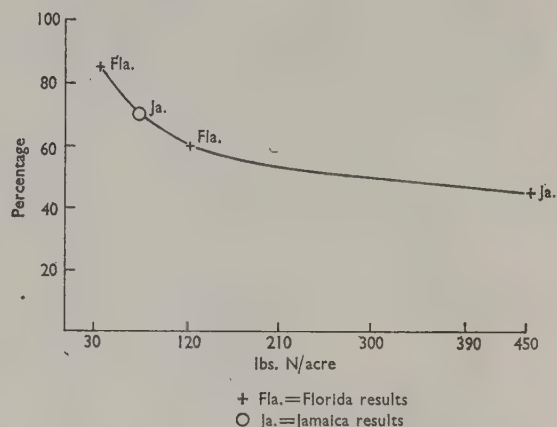


FIGURE 12

% utilization of applied nitrogen on pangola grass

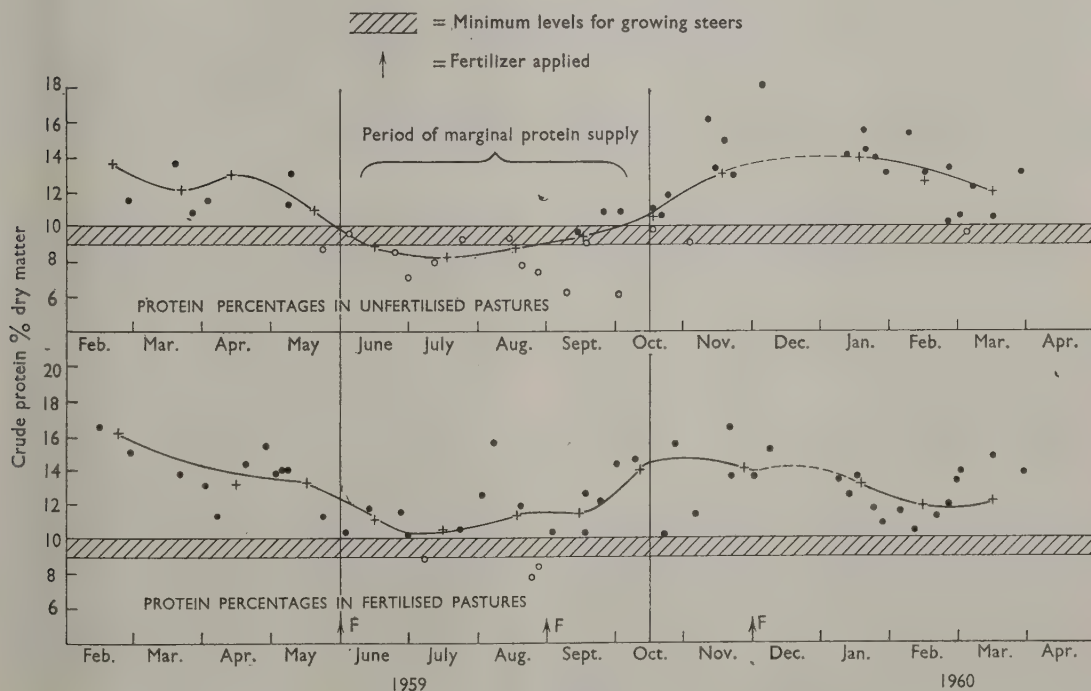


FIGURE 13

any digestibility studies on pangola grass which would relate its digestibility to those of temperate forage grasses, it is impossible to dogmatize on this figure.

had double the excess of the former over the minimum level recommended by the National Academy of Sciences. More important still are the actual minimum

levels recorded for individual crude protein samplings. These are presented in Table LIV.

It will be seen that only two fertilized pastures had at any time a minimum crude protein level under 10%, whereas all eight unfertilized pastures at some time during the year had crude protein concentrations of under 10%. In fact at only three grazings were the fertilized pasture steers grazing pasture whose protein

It is also of importance to note that the protein percentage does not entirely parallel the crude protein production. This is particularly so in the spring when the total production of both grass and dry matter may rise so rapidly that the crude protein percentage actually falls.

In terms of overall efficiency of protein utilization, it is possible to estimate the protein requirements of

TABLE LIV
RANGE OF CRUDE PROTEIN PERCENTAGES ON INDIVIDUAL PASTURES

Fertilized pastures	Crude protein as % of D.M.	Mean crude protein	Unfertilized pastures	Crude protein as % of D.M.	Mean crude protein
No.		%	No.		%
1	11.00-16.94	13.49	10	6.06-17.44	10.36
9	7.94-13.90	11.63	2	6.88-15.19	10.76
3	8.00-16.50	11.82	8	7.81-13.06	10.19
7	10.19-13.00	11.20	4	9.56-14.94	11.11
5	11.56-19.50	13.94	6	9.06-18.50	12.59
13	10.56-11.81	11.32	15	6.06-13.25	9.71
14	10.44-14.69	12.09	16	8.33-14.44	10.12
12	10.56	10.56		9.88	9.88
		12.2			10.7

was below 9.3%, whereas on no less than twelve separate occasions the unfertilized pasture steers had to contend with such grass.

Although the total crude protein of the fertilized pastures was only 19% greater in quantity than the total crude protein produced by the unfertilized pasture (see Table LII), the steers on the former pastures put

each set of pastures over the year, and see the degree of surplus protein provided.

It would appear that overall efficiency of utilization of the available protein is greater on the fertilized than on the unfertilized pastures, and that this may be due to the fertilizer raising the crude protein status to a level at which satisfactory growth can occur, and digestibility and utilization of the protein are also high.

TABLE LV
EFFICIENCY OF PROTEIN UTILIZATION

	Fertilized pastures	Unfertilized pastures
Total crude protein provided during the year	34,108 lb.	33,914 lb.
Total steer/days grazed	15,995	12,786
Total estimated protein requirements	23,993	19,179
Efficiency of protein utilization ..	70.3%	56.6%

on about 40% more in weight gains (see Table XLVIII). This may be partially due to the fact that the unfertilized pasture protein was frequently in too short a supply to maintain adequate growth, and the growth of this group of steers may not have been maintained at a steady rate.

Figure 13 shows how the crude protein content of the pastures varied throughout the year. The shaded belt represents the marginal zone of 8 to 11% crude protein. It will be readily seen that during the period June to October, the crude protein of many of the unfertilized pastures is either in or below this marginal zone.

The phosphorus content of the pastures

The phosphorus status of the grass seldom fell below 0.30% of its dry matter content and as the phosphorus requirements of beef steers of 500 to 800 lb. liveweight growing at 1.4 lb. per day are estimated to be about 0.30% of the dry matter in their ration, the figure of 0.30% allows little safety margin.

It would therefore appear that phosphorus deficiency in cattle could result from growing pangola grass on this particular terra-rossa soil. To counteract this possibility, from an early stage in these feeding trials all steers had access to a high phosphorus trace element mixture, thus throughout the year some phosphorus from this mixture would have been returned to the soil.

The potash status of the pastures

The potash content of the grass is given in Table LVI, from which it is evident that fertilizer caused a much higher level of this element in the dry matter and that a potash deficiency may well have been partly responsible for the reduced grass yields on the control plots. Unfortunately, the potash content of the samples varied so much that it was not possible to derive any conclusions along the above lines from the results obtained.

A summary of the potash analyses (expressed as percentages of the dry matter) is given below.

TABLE LVI
POTASH AS % OF THE DRY MATTER

Time of year	Number of pairs of samples	Mean K content of fertilized samples	Mean K content of unfertilized samples
		%	%
March-May ..	10	2.14	1.33
June-Aug. ..	11	2.09	1.16
Sept.-Nov. ..	17	2.28	1.32
Jan.-March ..	14	2.34	1.94
Total ..	52	Mean 2.23	1.46

The effects of mowing

The effect of mowing pangola was to lower the dry matter but to raise the crude protein content of the grass. It is difficult to assess to what extent the lowness of the cut, the type of mower and the time of year each contribute to the effects of mowing. The best protein production figures at Grier Park were achieved by two pastures mowed in December, 1958, and which did not require mowing in the following 12 months. A very low and rough (chain) mowing prior to the growing season may in some circumstances be preferable to the more general procedure of mowing stemmy seeding grass in the summer.

In view of the earlier remarks on pasture protein levels the following table demonstrates the value of mowing.

TABLE LVII

THE EFFECT OF MOWING ON CRUDE PROTEIN CONTENT OF THE PASTURE

Date	Treatment	Fertilized pasture (1) % crude protein	Unfertilized pasture (10) % crude protein
June 24	Fed	11.50	8.31
Aug. 19	Fed	11.81	7.63
Oct. 1	Fed	14.44	6.06
Oct. 7	Mowed	—	—
Nov. 10	Fed	16.94	17.44

Effects of pasture size

It is of interest that within the range of pastures used in this trial (1.5 to 7.1 acres) it was not possible to attribute higher productivity to the smaller pastures. Generally speaking, pasture production of both dry matter and crude protein appeared to be far more dependent upon grazing management than upon pasture size.

(M) New grass and legume varieties

Small observation nurseries have been established at Caymanas, Alumina Jamaica (2), Trelawny Estates and Frome in order to study new varieties of grass and legumes which might be suitable for inclusion in

local pastures. The principal new introductions and their behaviour to date are noted below.

Centrosema pubescens (Centro) from Queensland has germinated fairly well, particularly where moderate rains followed planting. Growth did not appear to be vigorous except at Frome, where the nursery has not experienced a very dry spell since planting. Seeds planted in mid-October in St. Ann gave rise to plants that were flowering before the end of the year. A number of flowers produced seeds of very poor quality in St. Ann; this may have been due to a soil mineral deficiency as the nursery was on very poor thin terra-rossa soil. Leaf analysis of *Centrosema* revealed its crude protein content to be 26.5%.

Townsville Lucerne, also from Queensland, was regarded with promise because of its adaptation to low rainfall areas in Australia. However, germination of this legume from fall planting was negligible and spring plantings will be repeated.

Pennisetum ciliare (Buffel grass Biloeala strain) is a Queensland grass bred for 20 to 30 in. rainfall areas. This is an upright fine leaved grass somewhat like guinea grass although without the tendency of that grass to form clumps. This grass germinated very well and October plantings were reaped for seed in late December. The grass was cut back following seeding and regrew as a much denser stand. Samples cut at grazing level in December had a crude protein content of 12.9%.

Giant pangola (*Digitaria decumbens* var.) and Merker (*Pennisetum purpureum* var.) imported from Puerto Rico were planted in a nursery at Innswood, but both grasses were destroyed by heavy-fall army-worm attacks immediately following planting. These two grasses show considerable promise in Puerto Rico and further importations are envisaged.

Indigofera hirsutum (hairy indigo) from Florida was originally imported as a cover crop for Worthy Park citrus. This legume, which grows very well under local conditions, is non-toxic and therefore unlike the creeping indigo imported some years ago. The imported material consisted of an "early" small-leaved and a "late" large-leaved strain which were mixed. Although this plant is a summer-seeder in Florida, October plantings were seeding at Christmas and at Worthy Park they continued to seed throughout the year. Root nodules were plentiful and foliage analysed contained 25.9% crude protein. The plant is an annual and its persistence will depend upon the degree to which it volunteers.

Preliminary observations suggest that it is unlikely that any of the legumes planted to date will be sufficiently vigorous to survive in a mixed sward with good quality pangola. However, both the Centro and the Indigo may be suitable for guinea, para and Wynne grass pastures which together make up several thousand acres of Estate's grazing land. Most of these lands cannot be cultivated mechanically nor can they be fertilized except by hand. Where production is always at a low level, on such lands the establishment of a

satisfactory legume, although initially costly, might well prove economic.

(N) Observations regarding tick-fever in imported bulls

Serial blood films made from imported bulls suffering from "tick fever" at Worthy Park suggested that the breakdowns in response to treatment may have been due to a mixed infection including *Babesia argentina* in addition to *B. bigemina* and *Anaplasma marginale*. *Babesia argentina* infection has not previously been described in Jamaica although it is well recognized in South America and in Australia. This organism resembles *B. bovis* in its size and its reproduction by binary fission, but unlike that organism it lies mainly to the centre of the red corpuscles. It is also very difficult to find microscopically and when found the affected cells may be present in groups of 10 to 30 widely separated from other affected groups. Clinically *B. argentina* resembles *B. bovis* except that there seems to be some tendency for the organism to accumulate in the cerebral capillaries, and cerebral lesions have been reported in the literature, and also appear to have been present clinically at Worthy Park. On this estate depression and inappetence, usually accompanied by a high temperature, precede actual "redwater" by as much as 48 hours. The significance of high body temperatures is difficult to assess in imported stock and at Worthy Park it is not customary to regard temperatures below 105.5° F. as febrile.

Following the publication of a report from Brazil on the artificial infection of imported stock with carrier blood containing all three organisms, followed by the making of serial blood slides, studying the progress of both *anaplasmosis* and *piroplasmosis* and then treating these diseases at the appropriate stages with modern therapeutics, an attempt was made to repeat this procedure.

This differed from the customary approach to imported bulls in the following important respects:—

- (1) 10 c.c. carrier blood was injected subcutaneously to the imported stock within 24 hours of arrival in the island. (Now that stock have to pass through a Quarantine Station whose tick-status is unknown this step is questionable.)
- (2) Serial blood slides were made every 2 days from the 6th to the 14th day—the incubation period of piroplasmosis.
- (3) When the animal exhibited a temperature of 105.5° F. or more accompanied by positive evidence of piroplasms in the blood between 6 and 14 days after inoculation it was treated with Ganaseg (4,4'-Diazoaminodibenzamidine Diacetate) 1 gm. per 1,000 lb. body weight given intramuscularly. One injection with this drug usually sufficed and breakdowns to either type of piroplasmosis appeared to be rare.
- (4) From 16 to 60 days after inoculation (the incubation period of *anaplasmosis*) blood slides were taken every 5 to 7 days until anaplasmas were detected. When this occurred the animal was

observed carefully. It usually exhibited a temperature rise over a period of 5 to 6 days, this commenced 4 or 5 days after blood anaplasmas were first detected. This febrile period was usually not severe, morning temperatures being about 103.5° F. and evening temperatures around 105.5° F. The appetite was usually capricious and at this stage concentrate feeding was reduced or eliminated and the bull given free access to molasses. In animals under 2 years old recovery was usually spontaneous without treatment although two or three milder recurrent bouts of the disease were often encountered. In older animals treatment with 1 gm. intramuscular aureomycin per 1,000 lb. body weight was advisable.

The above approach appears to be an improvement over that more conventionally adopted in the following respects:—

- (a) There is a fair degree of certainty that the animals will be infected with tick-fever. The probable date of infection is known and the incubation period of each disease is also known so that the onset of the clinical condition can be predicted.
- (b) During the incubation period of the two *Babesia* organisms very careful watch can be kept for the incidence of these two diseases.
- (c) Treatment of *Babesia* is essential and can be carried out with a drug that appears to work on both organisms.
- (d) A similar approach can be adopted to *anaplasmosis* except that because of the chronic nature of this disease it is preferable not to treat it if the animal itself is capable of overcoming the disease.
- (e) The mistake of treating all "fevers" in imported cattle with drugs that affect both groups of tick diseases, and thus may upset the immunity to the one that the animal is not suffering from, is avoided. As a consequence breakdowns are less common and losses rarer.

The further point that may be of future value is the high reliability of the newest complement-fixation test for *anaplasmosis*. Animals that give a positive response will have acquired a calfhood immunity to this disease and in our limited experience give very little trouble from this disease after importation. Piroplasmosis does not occur in the U.S.A. so that it is not possible to purchase stock from North America or from England with any resistance to the local species of redwater.

(O) Bulletins

Four livestock bulletins were circulated during the year.

1. January—"Selecting Beef Cattle on Performance Records"—Part II. This discussed the findings from the preliminary pre-weaning growth studies carried out in 1958.

2. June—"A Survey of Livestock Costings of Four Sugar Estates." This summarized the first year's farm costings carried out on four estates in the scheme.

3. August—"Report on the Visit to the Southern United States and Puerto Rico."

4. November—"Notes on Fertilizer Use in Relation to Improved Management of Pastures."

In addition, following the appointment of members of the S.M.A. group to the Main Livestock Development Committee set up by Government the department prepared a report on the development of the livestock industry. This put forward in general terms the views and preliminary recommendations of the main beef cattle interests within the Scheme in answer to the terms of reference given by the Hon. Parliamentary Secretary of the Ministry of Agriculture to the Livestock

Development Committee. This report was circulated to the Livestock Development Committee and at the request of the Hon. Parliamentary Secretary a number of extra copies were forwarded to him for circulation within the Ministry.

M. ACKNOWLEDGEMENTS

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APPENDIX I

CANE YIELD SURVEY

TABLE I
ISLAND CANE CROP FOR PAST 10 YEARS

Crop year	CANE GROUND						
	Total tonnage	% increase or decrease on previous crop	Tons purchased	% increase or decrease on previous crop	Tons estates	% increase or decrease on previous crop	Purchased cane % total
1950	2,474,754	11.9	764,054	19.9	1,710,700	8.6	31
1951	2,425,748	- 2.0	765,814	0.2	1,659,934	- 3.0	32
1952	2,468,902	1.8	819,371	0.7	1,649,531	- 0.6	33
1953	3,133,752	26.9	1,175,056	43.4	1,958,706	18.7	37
1954	3,503,788	11.8	1,380,096	17.5	2,123,692	8.4	39
1955	3,564,881	1.7	1,383,855	0.3	2,181,026	2.7	39
1956	3,219,977	- 9.7	1,209,410	- 12.6	2,010,567	- 7.8	38
1957	3,394,278	5.4	1,297,132	7.3	2,097,146	4.3	38
1958	3,237,218	- 4.6	1,253,044	- 3.4	1,984,174	- 5.4	39
1959	3,826,563	18.2	1,691,060	35.0	2,135,503	7.6	44

In the above table the tonnages are for cane actually ground in the factories. They include cane, the juice from which was sent direct to the distilleries for rum manufacture.

TABLE II
ACREAGE REAPED BY EACH ESTATE CROPS 1950-1959

Estates	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Appleton.. ..	1,301	1,217	1,538	1,536	2,029	2,243	2,263	2,483	2,507	2,988
Barnett	791	852	786	817	834	944	954	973	973	1,004
Bernard Lodge	4,368	4,780	5,061	4,678	4,925	4,127	3,733	3,820	4,080	4,057
Caymanas	2,697	2,720	2,879	2,835	2,963	2,905	2,513	2,722	2,405	2,893
Frome	7,971	8,687	8,975	9,774	10,100	10,177	10,205	10,782	11,017	10,629
Gray's Inn	1,984	1,873	1,903	1,956	1,864	2,013	1,929	1,964	1,919	1,998
Green Park	—	—	333	500	—	—	—	—	—	—
Hampden	1,566	1,706	1,847	2,112	2,443	2,678	2,538	2,462	2,570	2,685
Holland	741	826	896	1,018	1,108	1,223	1,228	1,296	1,219	1,454
Innswood	1,894	2,065	2,208	1,809	2,168	1,940	2,219	2,059	1,866	2,413
Ironshore	744	752	—	—	—	—	—	—	—	—
Jamaica Sugar Estates.. ..	2,976	2,884	2,914	2,938	3,137	3,177	3,078	2,964	3,205	3,226
Long Pond	1,722	1,842	1,824	1,803	1,846	1,836	1,783	1,647	1,802	1,822*
Monymusk	11,566	11,996	12,730	12,983	13,668	14,590	13,375	12,821	13,359	15,071
New Yarmouth	2,888	3,347	3,782	3,584	3,747	3,604	3,618	3,433	3,506	1,115†
Richmond/Landover	1,322	1,497	1,429	1,461	1,482	1,505	1,529	1,569	1,603	1,780
Rose Hall	1,114	1,152	1,190	1,231	1,291	1,335	1,436	1,314	1,306	1,291
Serge Island	1,182	1,228	1,211	1,288	1,347	1,339	1,531	1,370	1,682	1,852
Sevens	1,635	1,684	1,851	2,095	2,107	1,942	1,834	1,915	1,993	2,585
United Estates	1,895	1,697	1,826	1,747	1,948	1,935	1,823	2,156	2,411	2,487
Vale Royal	1,635	1,766	1,769	1,977	2,126	2,162	2,176	2,160	2,279	2,301*
Worthy Park	1,223	1,146	1,161	1,195	1,273	1,276	1,277	1,202	1,346	1,319
Total	52,343	55,517	58,213	59,517	62,496	62,341	61,092	61,139	63,048	64,870

* Long Pond amalgamated with Vale Royal operating as Trelawny Estates Ltd. reaped from 4,023 acres.

† 2,400 odd acres New Yarmouth sold to cane farming interests during 1958-59.

TABLE III

TONS CANE PER ACRE BY ESTATES FOR CROPS 1950-1959 ALSO 10 YEAR AVERAGE

Year	Apple- ton	Bar- nett	Ber- nard Lodge	Cay- manas	Frome	Gray's Inn Cent.	Green Park	Hamp- den	Hol- land	Inns- wood	Jamaica Sugar Estates	Long* Pond
1950	26.5	34.8	39.1	37.9	34.5	29.8	—	21.3	31.5	34.0	33.6	20.7
1951	23.8	30.5	35.6	34.1	30.6	27.6	—	26.1	25.8	32.2	35.9	20.3
1952	15.9	29.4	28.5	31.5	30.3	30.8	16.2	20.3	20.1	28.2	33.8	17.2
1953	26.1	32.7	29.7	35.2	35.3	31.3	15.5	25.5	30.2	35.0	39.9	25.3
1954	34.3	35.4	31.0	41.7	35.8	32.8	—	23.1	30.9	33.5	36.2	21.3
1955	23.6	32.1	35.1	41.3	29.8	29.4	—	27.8	28.5	37.5	36.1	31.7
1956	28.6	28.0	29.3	39.9	30.5	32.7	—	21.1	23.0	32.5	33.4	27.2
1957	29.2	29.2	33.6	39.5	38.3	29.1	—	25.9	28.6	34.7	37.1	30.0
1958	30.1	28.1	30.2	39.5	31.4	26.6	—	23.0	26.7	32.0	37.3	27.1
1959	28.8	32.6	28.8	39.4	38.0	30.3	—	26.0	29.1	23.4	39.0	30.9
10 year average	27.3	31.2	32.1	38.0	33.5	30.0	15.8	24.2	27.8	33.2	36.1	25.1

Year	Mony- musk	New Yar- mouth	Rich- mond/ Lland- overy	Rose Hall	Serge Island	Sevens	United Estates	*Vale Royal	Worthy Park	Island average	Total acres
1950	35.4	35.0	29.5	21.7	28.2	35.9	28.3	21.4	31.9	32.6	52,340
1951	30.9	34.3	23.9	21.2	26.0	33.1	26.1	22.5	22.8	29.9	55,515
1952	30.2	31.3	29.3	20.9	24.2	30.1	23.5	25.0	23.0	28.3	58,212
1953	36.9	34.2	24.8	18.4	31.7	37.2	31.0	28.0	35.5	33.0	59,316
1954	37.1	35.4	36.1	23.4	31.4	35.1	33.5	24.5	37.4	34.0	62,494
1955	41.0	36.7	33.4	23.9	36.5	40.7	31.2	34.5	36.6	34.8	62,840
1956	39.3	36.9	31.7	24.8	27.9	36.7	35.0	32.0	36.0	33.0	61,089
1957	38.0	32.4	30.4	24.0	27.4	35.0	37.5	25.6	37.1	34.3	61,139
1958	33.7	34.8	36.2	20.9	28.8	29.3	35.0	25.4	32.8	31.5	63,045
1959	31.3	38.7	31.4	25.9	31.9	36.0	35.4	26.0	37.6	33.0	64,866
10 year average	35.4	34.7	30.7	22.6	29.5	35.0	32.1	26.7	33.2	32.4	—

* Long Pond and Vale Royal amalgamated as Trelawny Ests. Ltd. produced 28.2 tons cane per acre.

TABLE IV

TONS CANE PER TON THEORETICAL 96° SUGAR BY ESTATES FOR 1955-1959

Estates	1955	1956	1957	1958	1959
Appleton	7.88	7.86	8.41	8.13	7.82
Barnett	8.08	7.73	7.90	7.69	8.32
Bernard Lodge	7.98	7.83	7.84	8.40	8.46
Caymanas	8.31	8.48	8.71	10.22	9.97
Frome	7.89	8.12	9.10	8.39	9.62
Gray's Inn Central	9.68	9.68	9.08	11.88	11.67
Hampden	8.34	7.71	8.12	8.72	9.19
Holland	8.10	9.00	8.32	8.71	9.25
Innswood	8.12	8.66	8.35	9.40	11.07
Jamaica Sugar Estates	8.20	8.63	8.60	9.42	9.56
*Long Pond	8.89	8.80	8.87	9.40	10.29
Monymusk	9.17	9.08	9.53	9.91	10.30
New Yarmouth	8.40	8.38	8.95	9.23	9.08
Richmond/Llandovery	8.73	8.52	8.41	10.65	9.42
Rose Hall	8.28	7.98	8.56	8.50	9.26
Serge Island	7.59	7.94	7.86	7.85	7.89
Sevens	8.67	8.70	8.57	9.51	9.25
United Estates	7.80	7.84	8.01	8.05	8.31
*Vale Royal	8.62	8.42	8.50	9.02	9.64
Worthy Park	7.01	7.22	7.05	7.32	7.50
Average	8.43	8.46	8.75	9.05	9.45

Figures quoted are theoretical—based on 100 B.H.E. and 97% Pol Extraction.

* Long Pond and Vale Royal = 9.96 tons cane per ton sugar.

TABLE V
TONS THEORETICAL 96° SUGAR PER ACRE BY ESTATES FOR 1955-1959

Estates	1955 (theoretical)	1956 (theoretical)	1957 (theoretical)	1958 (theoretical)	1959 (theoretical)
Appleton	3.00	3.64	3.47	3.71	3.68
Barnett	3.97	3.62	3.70	3.65	3.92
Bernard Lodge	4.40	3.74	4.29	3.60	3.40
Caymanas	4.97	4.70	4.54	3.87	3.95
Frome	3.78	3.75	4.21	3.74	3.94
Gray's Inn Central	3.03	3.38	3.20	2.24	2.62
Hampden	3.33	2.73	3.19	2.64	2.83
Holland	3.52	2.56	3.44	3.06	3.25
Innswood	4.62	3.75	4.16	3.41	3.01
Jamaica Sugar Estates	4.41	3.88	4.11	3.96	4.08
*Long Pond	3.57	3.09	3.38	2.88	3.00
Monymusk	4.47	4.32	3.99	3.41	3.03
New Yarmouth	4.37	4.40	3.62	3.77	4.26
Richmond/Llandoverly	3.82	3.72	3.61	3.40	3.33
Rose Hall	2.88	3.11	2.80	2.46	2.79
Serge Island	4.81	3.52	3.49	3.67	4.04
Sevens	4.69	4.22	4.08	3.08	3.89
United Estates	3.97	4.46	4.68	4.35	4.26
*Vale Royal	4.00	3.80	3.01	2.81	2.70
Worthy Park	5.22	4.98	5.27	4.48	5.00
Average	4.12	3.90	3.92	3.48	3.49

* Long Pond + Vale Royal = 2.83 tons sugar per acre.

TABLE VI
CWT. THEORETICAL 96° SUGAR PER ACRE PER MONTH BY ESTATES FOR 1955-1959

Estates	1955	1956	1957	1958	1959
Appleton.. .. .	5.49 (86) 100	6.28 (96) 93	5.98 (95) 92	5.55 (96) 91	6.28 (113) 105
Barnett	6.42 (100) 96	6.11 (93) 104	6.08 (93) 102	6.05 (99) 99	6.73 (114) 122
Bernard Lodge	6.43 (94) 119	6.81 (98) 114	6.41 (101) 110	5.76 (104) 101	5.69 (108) 103
Caymanas	7.63 (113) 96	7.48 (108) 105	6.90 (109) 107	5.87 (106) 110	5.70 (109) 106
Frome	6.09 (102) 78	6.85 (105) 86	6.73 (104) 80	6.38 (105) 86	5.98 (100) 88
Gray's Inn Central	4.87 (82) 75	5.63 (93) 87	5.04 (82) 80	3.86 (71) 70	4.89 (84) 73
Hampden	4.83 (92) 74	4.36 (83) 78	5.03 (97) 81	4.08 (90) 85	4.03 (89) 89
Holland	4.77 (80) 98	4.76 (78) 92	5.70 (88) 95	4.91 (81) 91	4.91 (89) 82
Innswood	6.26 (92) 108	6.04 (87) 100	5.99 (95) 113	5.29 (96) 104	4.52 (86) 109
Jamaica Sugar Estates	6.91 (116) 94	6.51 (108) 84	7.10 (115) 88	6.03 (111) 86	6.03 (103) 91
*Long Pond	5.38 (103) 112	5.47 (104) 108	5.54 (107) 100	5.00 (111) 104	5.02 (111) 88
Monymusk	7.22 (106) 100	7.09 (102) 99	6.39 (100) 93	6.04 (109) 106	4.90 (93) 117
New Yarmouth	6.43 (94) 97	6.55 (95) 94	5.81 (92) 96	6.14 (111) 95	6.50 (124) 105
Richmond/Llandoverly	6.21 (104) 74	6.15 (102) 80	6.06 (98) 75	5.50 (101) 77	5.81 (99) 84
Rose Hall	4.76 (91) 99	5.22 (99) 84	4.70 (91) 98	4.47 (99) 102	4.66 (103) 110
Serge Island	6.34 (106) 113	5.52 (91) 109	6.13 (99) 106	5.93 (109) 97	6.25 (110) 113
Sevens	7.28 (107) 106	7.12 (103) 110	6.81 (108) 115	5.64 (102) 127	6.26 (119) 128
United Estates	6.79 (114) 96	7.22 (93) 96	7.20 (95) 96	7.40 (96) 79	7.11 (98) 85
*Vale Royal	6.19 (118) 135	6.26 (119) 132	5.28 (102) 132	4.58 (101) 143	4.71 (104) 136
Worthy Park	8.67 (145) 107	8.65 (111) 107	8.31 (109)	8.33 (108)	7.58 (104)
Average	6.42	6.54	6.28	5.81	5.45

Bold figures in brackets = cwt. theoretical sugar per acre per month expressed as a percentage of the island average in the same year.
Light figures in brackets = cwt. theoretical sugar per acre per month expressed as a percentage of the average for the ecological area in the same year.

* Trelawny Estates Ltd.: (88)
(107)

TABLE VII
TOTAL ACREAGE UNDER VARIETY % TOTAL ACREAGE REAPED BY ESTATES AND ECOLOGICAL GROUPS FOR 1955-1959

Estate	B3439					B34104					B37161					B37172					B41227				
	55	56	57	58	59	55	56	57	58	59	55	56	57	58	59	55	56	57	58	59	55	56	57	58	59
Appleton ..	..	..	..	..	..	36	15	8	2	1	3	2	9	3	1	19	19	19	13	7	23	42	40	46	46
Barnett ..	25	20	11	1	..	..	..	..	..	..	56	46	41	31	15	1	3	2	3	..	5	8	10	16	31
Frome ..	..	..	..	..	..	37	31	14	5	..	11	9	8	2	..	..	..	..	..	..	27	40	44	60	52
Holland ..	5	3	..	1	..	42	35	32	18	13	..	..	..	..	..	..	..	..	..	..	5	7	9	8	10
Wet West Estates ..	2	2	1	..	..	35	20	14	5	1	12	9	8	4	1	3	3	3	2	1	23	35	38	45	48
Hampton ..	1	1	1	..	..	..	..	..	..	..	28	26	22	17	10	..	..	..	..	..	1	1	2	4	9
Long Road ..	6	7	5	1	2	15	8	4	1	..	29	31	23	21	17	..	..	..	..	..	..	..	..	..	..
Rose Hall ..	44	28	26	20	11	11	7	6	5	1	15	15	16	16	4	..	..	..	..	..	5	12	23	33	39
Vale Royal ..	6	3	2	1	..	1	..	..	..	..	21	22	20	16	12	..	..	..	..	..	3	4	4	4	7
Dry North Coast ..	10	8	6	4	2	6	3	2	1	..	24	24	21	17	12	..	..	..	..	..	2	4	7	11	14
Barnard Lodge ..	7	6	4	3	2	37	28	18	11	9	7	6	6	5	2	..	..	..	..	..	8	9	10	9	7
Caymans ..	54	30	22	17	12	7	1	..	..	..	3	3	2	2	1	..	..	..	..	..	..	..	..	..	..
Grinswood ..	14	6	3	1	1	76	74	69	57	51	..	..	..	..	..	..	..	..	..	..	6	14	19	33	40
Marblehead ..	..	..	..	..	..	4	1	..	..	..	3	1	1	..	..	..	..	..	..	..	39	51	64	69	69
New Yarmouth ..	42	33	23	16	13	6	3	1	..	..	3	3	1	1	..	..	..	..	..	..	18	19	20	17	20
Sevens ..	53	43	52	17	6	6	5	5	..	..	..	..	..	..	..	..	..	..	..	..	7	11	18	42	43
Irrigated Estates ..	20	14	9	6	3	14	11	9	6	6	3	2	2	1	1	..	..	..	..	..	24	31	38	43	47
Gray's Inn Central ..	11	7	7	6	8	4	4	1	1	1	..	..	..	..	..	43	43	36	32	29	..	..	..	..	2
Jamaica Sugar Estates ..	48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	71	68	67	62	61	..	..	..	..	..
Richmond/Landover ..	11	6	4	..	..	2	1	1	1	1	16	15	9	6	3	76	65	59	40	25	1	1	..	5	10
Sage Island ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wet East Estates ..	14	10	7	5	3	1	1	..	..	..	3	3	2	1	1	52	43	45	39	34	2	3	6	7	11
United Estates ..	18	9	3	1	..	21	9	11	1	..	2	2	2	1	1	2	2	1	..	..	12	15	20	24	26
Worthy Park ..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24	28	27	36	40
Central Estates ..	11	5	2	1	..	13	6	7	..	..	1	1	1	1	1	1	1	..	..	..	17	21	23	28	30
Overall Average ..	13	9	6	4	2	16	11	8	4	3	8	7	6	4	2	7	7	7	6	5	18	24	29	34	37

TABLE VII—continued

Estates	B42931						B4362						C5331						C5421						Others					
	55	56	57	58	59		55	56	57	58	59		55	56	57	58	59		55	56	57	58	59		55	56	57	58	59	
Appleton	—	—	—	—	2		5	11	18	26	31		1	4	2	2	1		—	—	—	—	—		13	7	11	8	11	
Barnett	—	—	—	—	—		6	11	23	37	44		—	—	—	—	—		—	—	—	—	—		8	13	12	10	10	
Frome	3	3	3	3	2		20	26	30	39	49		—	—	—	—	—		—	—	—	—	—		9	1	1	1	1	
Holland	—	—	—	—	—		18	23	27	39	62		—	—	—	—	—		—	—	—	—	—		33	35	33	34	15	
West West Estates ..	2	2	2	2	2		16	22	28	37	44		—	—	—	—	—		—	—	—	—	—		9	6	6	5	4	
Hampton	—	—	—	—	1		13	14	19	36	27		2	3	5	7	8		1	1	1	1	1		54	54	49	45	42	
Long Pond	1	1	3	3	4		—	—	1	2	2		2	7	15	22	33		13	21	20	19	19		33	33	24	28	13	
Rose Hall	—	—	—	—	—		8	9	9	3	4		1	4	5	6	8		—	—	—	—	—		21	32	22	18	33	
Vale Royal	2	2	3	4	5		9	13	13	18	21		13	23	20	33	36		20	17	18	9	5		19	18	21	12	14	
Dry North Coast ..	1	1	2	2	2		7	9	10	14	16		6	9	10	18	21		9	10	10	7	7		35	32	32	26	36	
Bernard Lodge ..	16	34	33	43	48		31	33	35	39	32		—	—	—	—	—		—	—	—	—	—		5	4	4	3	2	
Laymans	17	28	33	39	43		20	23	26	29	32		—	—	—	—	—		1	1	1	1	1		18	7	6	6	8	
Manor	—	—	—	—	—		—	—	—	—	—		—	—	—	—	—		—	—	—	—	—		15	10	10	7	7	
Monymusk	25	22	18	14	8		9	11	8	10	15		—	—	—	—	—		—	—	—	—	—		6	8	7	6	7	
New Yarmouth ..	13	27	35	44	44		6	7	9	12	10		—	—	—	—	—		—	—	—	—	—		2	6	17	10	12	
Sevens	—	6	6	6	6		36	30	33	30	39		—	—	—	—	1		—	—	—	—	—		8	6	7	4	5	
Irrigated Estates ..	18	21	22	23	19		13	14	14	15	13		—	—	—	—	—		—	—	—	—	—		9	7	6	6	6	
Gray's Inn Central ..	—	3	1	3	4		35	28	41	43	43		—	—	—	—	—		—	—	—	—	—		17	17	14	15	13	
Jamaica Sugar Estates ..	—	—	—	—	—		20	26	26	26	35		—	—	—	—	—		—	—	—	—	—		17	16	13	13	14	
Richmond/Llandovery ..	—	—	1	1	1		10	13	13	17	17		—	—	—	—	—		—	—	—	—	—		16	14	15	13	13	
Serge Island	—	—	—	—	1		9	23	28	47	56		—	—	—	—	—		—	—	—	—	—		4	5	9	8	7	
West East Estates ..	—	—	—	—	1		17	24	29	35	41		—	—	—	—	—		—	—	—	—	—		11	11	11	12	8	
United Estates	6	7	7	8	9		35	42	44	55	56		—	—	—	—	—		—	—	—	—	—		14	14	12	10	9	
Worthy Park	9	5	1	—	—		48	51	57	51	44		—	—	—	—	—		—	—	—	—	—		18	16	15	13	16	
Central Estates	7	6	5	5	6		34	46	49	54	51		—	—	—	—	—		—	—	—	—	—		16	14	13	11	12	
Overall Average	9	10	11	11	10		14	18	21	25	30		1	2	2	2	3		1	1	1	1	1		13	11	9	9	7	

TABLE VIII

PLANT ACREAGE UNDER VARIETY % TOTAL PLANT ACREAGE REAPED BY ESTATES AND ECOLOGICAL GROUPS FOR 1955-59

Estates	B3439					B37161					B37172					B41227				
	55	56	57	58	59	55	56	57	58	59	55	56	57	58	59	55	56	57	58	59
Appleton	—	—	—	—	—	8	—	—	—	—	—	2	5	1	—	56	56	20	19	40
Barnett	—	—	—	—	—	43	4	—	—	—	—	—	—	—	—	14	35	21	32	88
Frome	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	76	62	52	48	58
Holland	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	43	20	22	—	—
Wet West Estates ..	—	—	—	—	—	8	—	—	—	—	—	—	1	—	—	66	59	41	39	50
Hampden	2	—	—	—	—	19	8	6	8	—	—	—	—	—	—	2	6	10	13	22
Long Pond	2	—	—	—	—	20	2	18	12	1	—	1	—	—	—	—	6	13	19	88
Rose Hall	20	6	—	—	—	15	17	—	3	4	—	—	—	—	—	21	44	100	76	83
Vale Royal	—	—	—	—	—	11	—	—	3	2	—	—	—	—	—	13	18	10	6	9
Dry North Coast ..	6	2	—	—	—	17	8	8	7	1	—	—	—	—	—	9	23	28	18	30
Bernard Lodge ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21	7	17	—	2
Caymanas	11	18	8	—	2	—	—	—	—	2	—	—	—	—	—	1	15	10	16	3
Innswood	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	52	100	79	86	77
Monymusk	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	67	60	82	60	65
New Yarmouth ..	5	—	3	16	—	2	2	—	—	—	—	—	—	—	—	17	10	10	16	5
Sevens	2	—	—	—	4	—	—	—	—	—	—	—	—	—	—	15	22	60	88	42
Irrigated Estates ..	2	1	1	2	1	—	—	—	—	—	—	—	—	—	—	48	41	51	54	40
Gray's Inn Central ..	—	3	9	8	22	—	—	—	—	—	13	18	8	49	23	—	—	—	—	20
Jamaica Sugar Estates ..	—	—	—	—	—	—	—	—	—	—	31	52	88	43	37	—	—	—	—	—
Richmond/Llandovery ..	13	—	—	—	—	18	1	—	—	—	—	—	—	—	—	21	52	57	51	40
Serge Island	10	—	—	—	—	—	—	—	—	—	66	27	47	8	10	2	—	6	11	17
Wet East Estates ..	7	—	3	1	3	5	—	—	—	—	16	28	23	22	19	6	12	24	16	18
United Estates	—	—	—	—	—	5	—	—	—	2	—	—	—	—	—	5	14	40	24	25
Worthy Park	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	55	—	25	84	43
Central Estates	—	—	—	—	—	3	—	—	—	2	—	—	—	—	—	23	10	37	38	30
Overall Average ..	2	1	1	1	1	3	1	1	1	—	1	3	3	3	2	43	39	42	38	40

TABLE VIII—continued

Estates	B42231					B4362					Co331					Others				
	55	56	57	58	59	55	56	57	58	59	55	56	57	58	59	55	56	57	58	59
Appleton	—	—	—	3	6	20	21	47	77	37	6	10	—	—	—	15	11	28	—	17
Barnett	—	—	—	—	2	7	44	79	67	30	—	—	—	—	—	36	17	—	1	—
Frome	4	5	2	1	—	20	33	44	50	41	—	—	—	—	—	—	—	2	1	—
Holland	—	—	—	—	—	48	80	60	52	82	—	—	—	—	—	9	—	18	48	18
Wet West Estates ..	3	4	2	1	1	21	33	48	55	44	1	2	—	—	—	6	2	8	5	5
Hampden	—	4	—	—	—	30	24	54	38	22	11	2	14	13	15	36	56	16	28	41
Long Pond	7	—	9	5	—	—	6	4	5	3	13	33	49	43	37	58	49	7	16	21
Rose Hall	—	—	—	—	—	3	—	—	—	13	3	19	—	9	—	38	14	—	12	—
Vale Royal	12	9	30	6	6	12	46	33	31	32	21	10	—	44	40	26	17	27	10	12
Dry North Coast ..	4	3	6	3	1	13	19	25	24	20	11	24	22	31	24	29	22	11	17	24
Bernard Lodge ..	41	75	65	73	82	38	13	18	27	13	—	—	—	—	—	—	5	—	—	3
Caymanas	42	58	51	44	50	26	5	32	41	35	1	3	—	—	1	19	6	4	—	7
Innswood	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	48	—	19	14	21
Monymusk	18	20	11	10	—	12	10	—	13	27	—	—	—	—	—	2	10	7	3	8
New Yarmouth ..	31	68	63	40	77	17	10	7	16	5	—	—	—	—	—	28	10	17	12	15
Sevens	—	35	5	—	5	60	25	34	3	44	—	—	—	5	—	2	18	1	9	5
Irrigated Estates ..	23	34	31	20	20	21	10	11	15	28	—	—	—	—	—	6	14	6	9	11
Gray's Inn Central ..	—	16	5	18	12	70	64	60	14	11	—	—	—	—	—	17	—	18	11	12
Jamaica Sugar Estates ..	—	—	—	—	—	46	40	12	42	61	—	—	—	—	—	24	8	—	11	3
Richmond/Llandovery ..	—	1	3	1	—	54	36	28	37	48	—	3	—	—	—	14	7	12	11	12
Serge Island	—	—	—	—	1	20	73	47	67	66	—	—	—	—	—	3	—	—	14	6
Wet East Estates ..	—	3	3	3	2	49	55	37	45	53	—	—	—	—	—	17	2	10	13	7
United Estates	11	5	9	7	12	79	76	44	63	48	—	—	—	—	—	—	5	7	6	13
Worthy Park	—	33	—	—	—	33	64	17	12	30	—	—	—	—	—	12	3	58	4	27
Central Estates	7	13	7	5	8	62	72	39	51	43	—	—	—	—	—	5	5	17	6	17
Overall Average ..	14	18	16	10	10	24	27	27	33	34	2	3	2	4	3	11	8	8	10	10

TABLE IX
TONS CANE PER ACRE FOR VARIETIES BY ESTATES AND ECOLOGICAL GROUPS—1959 CROP

Estates	B3439	B34104	B37161	B37172	B41227	B42231	B4362	Co331	Co421	Mixed and others	Average
Appleton	—	21.9	27.9	23.5	30.3	42.4	27.7	26.8	—	23.0	28.8
Barnett	—	—	24.6	—	36.3	39.0	33.5	—	—	28.6	32.6
Frome	42.9	38.7	37.4	—	37.6	35.7	38.5	—	—	37.0	38.0
Holland	—	18.6	—	—	26.9	—	32.6	—	—	24.6	29.1
Wet West Estates	42.9	18.9	26.3	23.5	36.0	36.9	35.9	26.8	—	25.4	35.1
Hampden	30.5	—	19.7	—	31.6	23.1	27.5	31.1	24.5	24.3	26.0
Rose Hall	24.7	26.6	26.1	—	28.7	—	23.7	25.8	—	23.0	25.9
Trelawny Estates	24.7	—	27.0	—	31.7	27.9	25.2	29.8	26.9	27.0	28.2
Dry North Coast	24.8	25.6	24.8	—	30.4	27.6	26.5	29.8	26.5	24.7	27.1
Bernard Lodge	28.3	29.9	27.4	—	24.0	29.3	28.1	—	—	34.1	28.8
Caymanas	35.9	—	43.3	—	29.3	41.5	39.9	14.1	—	34.2	39.4
Innswood	29.2	29.5	—	—	38.0	33.7	31.5	—	—	36.1	33.4
Monymusk	27.4	—	18.7	—	31.3	27.5	34.4	—	—	29.4	31.3
New Yarmouth	32.7	—	—	—	37.9	41.8	34.2	—	—	39.9	38.7
Sevens	31.1	—	—	—	38.8	30.7	36.6	14.3	—	25.4	36.0
Irrigated Estates	31.6	29.6	28.5	—	32.4	32.8	34.7	14.2	—	31.5	32.6
Gray's Inn Central	30.6	23.6	—	29.9	31.0	31.0	30.7	—	—	30.0	30.3
Jamaica Sugar Estates	—	—	42.1	—	—	—	33.5	—	—	39.1	39.0
Richmond/Llandovery	27.0	32.7	25.7	—	33.7	28.9	30.5	—	—	29.7	31.4
Serge Island	—	—	29.4	31.9	38.4	43.8	31.5	—	—	24.5	31.9
Wet East Estates	29.2	28.1	27.1	38.1	34.5	31.8	31.7	—	—	30.9	34.0
United Estates	—	—	28.9	—	35.8	35.5	35.3	—	—	35.8	35.4
Worthy Park	—	—	—	—	39.8	23.2	35.5	—	—	37.7	37.6
Central Estates	—	—	28.9	—	37.5	35.3	35.4	—	—	36.7	36.1
Overall Average	30.2	28.3	25.7	37.2	33.8	32.9	34.1	29.4	26.5	28.6	33.0

TABLE X
TONS CANE PER TON THEORETICAL 96° SUGAR FOR VARIETIES BY ESTATES AND ECOLOGICAL GROUPS—1959 CROP

Estates	B3439	B34104	B37161	B37172	B41227	B42231	B4362	Co331	Co421	Mixed and others	Average
Appleton	—	8.34	7.34	7.67	8.02	7.99	7.46	8.53	—	8.00	7.82
Barnett	—	—	8.21	—	8.67	9.36	8.15	—	—	8.00	8.32
Frome	11.54	11.66	10.41	—	10.06	9.72	9.15	—	—	9.45	9.62
Holland	—	9.41	—	—	8.45	—	8.97	—	—	8.94	9.25
Wet West Estates	11.54	9.30	8.15	7.67	9.58	9.30	8.86	8.53	—	8.42	9.16
Hampden	8.75	—	9.20	—	9.58	9.27	8.87	9.76	10.05	9.11	9.19
Rose Hall	9.44	9.29	9.10	—	9.19	—	9.23	9.36	—	9.29	9.26
Trelawny Estates	9.89	—	9.79	—	10.36	9.65	9.22	10.16	10.10	9.91	9.96
Dry North Coast	9.51	9.29	9.61	—	9.67	9.62	9.01	10.06	10.09	9.36	9.59
Bernard Lodge	8.49	8.59	8.23	—	8.64	8.52	8.10	—	—	9.43	8.46
Caymanas	9.43	—	11.33	—	10.34	10.20	9.61	16.61	—	10.63	9.97
Innswood	9.39	11.21	—	—	10.89	11.42	12.78	—	—	11.26	11.07
Monymusk	9.81	—	11.29	—	10.40	10.24	10.00	—	—	10.12	10.30
New Yarmouth	9.00	—	—	—	9.22	9.00	8.83	—	—	9.41	9.08
Sevens	8.82	—	—	—	9.77	9.19	8.81	9.48	—	8.96	9.25
Irrigated Estates	9.20	10.50	9.81	—	10.31	9.33	9.35	10.31	—	10.10	9.87
Gray's Inn Central	11.58	11.58	—	11.82	11.86	11.59	11.38	—	—	11.64	11.57
Jamaica Sugar Estates	—	—	—	9.81	—	—	9.01	—	—	9.75	9.56
Richmond/Llandovery	8.94	9.65	8.46	—	9.89	10.42	8.89	—	—	9.53	9.42
Serge Island	—	—	9.10	8.38	8.66	8.79	7.74	—	—	8.12	7.89
Wet East Estates	10.50	10.39	8.16	9.76	9.35	10.80	9.00	—	—	9.93	9.47
United Estates	—	—	8.45	—	8.46	8.88	8.15	—	—	8.36	8.31
Worthy Park	—	—	—	—	7.80	7.31	7.15	—	—	7.71	7.50
Central Estates	—	—	8.45	—	8.13	8.85	7.82	—	—	8.03	8.00
Overall Average	9.45	10.39	9.31	9.66	9.87	9.35	8.89	10.02	10.09	9.40	9.45

TABLE XI

TONS THEORETICAL 96° SUGAR PER ACRE FOR VARIETIES BY ESTATES AND ECOLOGICAL GROUPS—1959 CROP

Estates	B3439	B34104	B37161	B37172	B41227	B42231	B4362	Co331	Co421	Mixed and others	Average
Appleton	—	2.59	3.80	3.06	3.85	5.31	3.71	3.14	—	2.88	3.68
Barnett	—	—	3.00	—	4.18	4.17	4.11	—	—	3.57	3.92
Frome	3.71	3.31	3.59	—	3.74	3.67	4.20	—	—	3.92	3.94
Holland	—	1.97	—	—	3.18	—	3.64	—	—	2.75	3.25
Wet West Estates	3.71	2.03	3.23	3.06	3.75	3.97	4.06	3.14	—	3.23	3.83
Hampden	3.50	—	2.12	—	3.30	2.49	3.10	3.19	2.43	2.67	2.83
Rose Hall	2.62	2.75	2.87	—	3.12	—	2.57	2.75	—	2.47	2.79
Trelawny Estates	2.50	—	2.76	—	3.06	2.89	2.74	2.94	2.66	2.64	2.83
Dry North Coast	2.61	2.75	2.59	—	3.14	2.86	2.94	2.96	2.63	2.64	2.82
Bernard Lodge	3.34	3.49	3.33	—	2.78	3.44	3.47	—	—	3.61	3.40
Caymanas	3.59	—	3.83	—	3.80	4.07	4.16	0.85	—	3.23	3.95
Innswood	3.11	2.63	—	—	3.39	2.95	2.47	—	—	3.21	3.01
Monymusk	2.79	—	1.65	—	3.01	2.66	3.45	—	—	2.91	3.03
New Yarmouth	3.63	—	—	—	4.11	4.64	3.87	—	—	4.17	4.26
Sevens	3.53	—	—	—	3.97	3.54	4.16	1.51	—	2.88	3.89
Irrigated Estates	3.44	3.82	2.91	—	3.15	3.52	3.71	1.88	—	3.12	3.31
Gray's Inn Central	2.64	2.04	—	2.53	2.62	2.68	2.69	—	—	2.58	2.62
Jamaica Sugar Estates	—	—	—	4.29	—	—	3.71	—	—	4.02	4.08
Richmond/Llandovery	3.02	3.39	3.04	—	3.41	2.72	3.43	—	—	3.11	3.33
Serge Island	—	—	3.81	4.02	4.54	4.99	4.07	—	—	3.02	4.04
Wet East Estates	2.79	2.70	3.80	3.91	3.69	2.95	3.52	—	—	3.11	3.59
United Estates	—	—	3.43	—	4.21	4.00	4.34	—	—	4.29	4.26
Worthy Park	—	—	—	—	5.10	3.17	4.97	—	—	4.89	5.00
Central Estates	—	—	3.43	—	4.62	3.98	4.52	—	—	4.58	4.52
Overall Average	3.20	2.73	2.76	3.85	3.42	3.52	3.84	2.93	2.63	3.05	3.49

TABLE XII

CWT. THEORETICAL 96° SUGAR PER ACRE PER MONTH FOR VARIETIES BY ESTATES AND ECOLOGICAL GROUPS—1959 CROP

Estates	B3439	B34104	B37161	B37172	B41227	B42231	B4362	Co331	Co421	Mixed and others	Average
Appleton	—	4.64	6.92	5.61	6.19	7.19	6.84	4.83	—	5.27	6.26
Barnett	—	—	4.83	—	7.16	7.78	7.14	—	—	6.94	6.78
Frome	5.81	4.73	3.77	—	5.67	5.90	6.37	—	—	5.64	5.98
Holland	—	2.40	—	—	5.24	—	5.59	—	—	4.53	4.91
Wet West Estates	5.31	2.55	5.06	5.61	5.81	6.19	6.37	4.88	—	5.27	5.97
Hampden	5.36	—	3.28	—	4.70	3.83	4.39	4.25	3.37	3.83	4.03
Rose Hall	4.43	4.45	4.72	—	5.17	—	4.18	4.64	—	4.16	4.66
Trelawny Estates	4.52	—	4.99	—	4.90	4.82	4.74	4.97	4.59	4.72	4.85
Dry North Coast	4.45	4.45	4.43	—	4.96	4.75	4.50	4.84	4.37	4.09	4.52
Bernard Lodge	5.64	5.89	5.76	—	4.73	5.69	5.87	—	—	6.20	5.69
Caymanas	6.11	—	4.94	—	6.04	5.88	6.93	0.81	—	5.05	5.70
Innswood	3.77	4.05	—	—	5.13	4.41	4.21	—	—	4.48	4.52
Monymusk	4.58	—	2.79	—	4.84	4.43	5.54	—	—	4.90	4.90
New Yarmouth	6.21	—	—	—	5.98	7.01	5.86	—	—	6.38	6.50
Sevens	5.78	—	—	—	6.29	5.65	6.68	3.24	—	4.60	6.26
Irrigated Estates	5.74	4.42	4.80	—	5.03	5.52	5.88	2.39	—	5.05	5.25
Gray's Inn Central	4.97	4.54	—	4.46	4.28	4.88	5.21	—	—	4.94	4.89
Jamaica Sugar Estates	—	—	—	6.49	—	—	5.34	—	—	6.31	6.03
Richmond/Llandovery	5.66	6.31	5.82	—	5.69	5.17	6.10	—	—	5.64	5.81
Serge Island	—	—	6.54	6.37	6.50	7.16	6.70	—	—	4.67	6.45
Wet East Estates	5.23	5.48	6.08	6.08	5.96	5.26	5.82	—	—	5.38	5.85
United Estates	—	—	5.95	—	6.78	6.70	7.86	—	—	7.07	7.11
Worthy Park	—	—	—	—	7.29	5.29	7.94	—	—	7.35	7.56
Central Estates	—	—	5.95	—	7.03	6.68	7.54	—	—	7.21	7.28
Overall Averages	5.47	4.18	4.64	6.05	5.40	5.87	6.12	4.79	4.37	4.92	5.54

TABLE XIII

COMPARISON OF VARIETIES SHOWING ACTUAL YIELDS AND EXPRESSED AS A PERCENTAGE OF B4362—1959 CROP

	B4362	B3439	B34104	B37161	B37172	B41227	B42231	Co331	Co421
Tons cane per acre	2.75 (100)	2.59 (94)	2.17 (78)	2.16 (79)	2.92 (113)	2.66 (97)	2.60 (94)	2.40 (94)	2.20 (108)
per month	2.78 (100)								
	2.73 (100)								
	2.59 (100)								
	2.74 (100)								
	2.76 (100)								
	2.55 (100)								
	2.03 (100)								
Cwt. sugar per acre	5.91 (100)	5.47 (93)	4.18 (68)	4.64 (75)	6.05 (101)	5.40 (87)	5.57 (90)	4.79 (82)	4.37 (97)
per month	6.16 (100)								
	6.16 (100)								
	6.01 (100)								
	6.18 (100)								
	6.21 (100)								
	5.84 (100)								
	4.51 (100)								
Tons cane per ton	9.32 (100)	9.45 (99)	10.39 (87)	9.31 (95)	9.66 (89)	9.87 (90)	9.35 (95)	10.02 (87)	10.09 (89)
sugar	9.01 (100)								
	8.87 (100)								
	8.63 (100)								
	8.89 (100)								
	8.88 (100)								
	8.74 (100)								
	9.00 (100)								

TABLE XIV

TONS CANE PER ACRE FOR ESTATES BY CANE CLASS—1959 CROP

Estates	Fall plants	Spring plants	Standover spring	1st ratoons	2nd ratoons	3rd ratoons	Old cane	Average
Appleton	36.5	29.1	—	27.5	26.5	27.7	27.0	28.8
Barnett	86.1	40.7	—	32.3	33.1	29.1	27.7	32.6
Bernard Lodge	32.4	31.7	—	30.8	24.9	25.0	28.6	28.8
Caymanas	52.5	38.0	57.3	35.0	31.0	33.8	32.2	39.4
Frome	—	41.3	—	39.8	39.1	38.0	33.9	38.0
Gray's Inn Central	36.4	32.7	—	28.4	28.2	31.0	30.6	30.3
Hampden	40.5	32.1	—	27.3	26.4	22.7	20.3	26.0
Holland	46.2	38.8	27.9	25.8	30.9	25.3	25.0	29.1
Innswood	—	45.9	—	34.2	34.1	33.5	29.5	33.4
Jamaica Sugar Estates	53.3	33.9	—	37.0	33.7	31.1	39.2	39.0
Monymusk	—	33.1	51.5	29.9	25.9	29.0	28.7	31.3
New Yarmouth	51.7	36.7	—	45.5	38.2	36.8	33.6	38.7
Richmond/Llandovery	51.5	32.7	—	32.2	30.0	26.3	27.0	31.4
Rose Hall	—	30.6	—	29.2	28.2	25.1	23.2	25.9
Serge Island	48.0	31.6	—	31.9	32.0	29.9	26.7	31.9
Sevens	47.2	39.1	—	32.5	41.1	27.6	33.0	36.0
Long Pond } Trelawny Estates ..	35.3	30.0	47.5	30.8	31.2	27.7	25.1	28.2
Vale Royal }								
United Estates	50.6	41.1	—	35.8	36.7	33.2	31.0	35.4
Worthy Park	—	39.2	—	39.4	40.7	37.6	36.1	37.6
Average	42.7	36.4	49.0	33.0	31.4	31.3	30.0	33.0

Note: Ratoon standover for Monymusk = 39.8 tons cane per acre.

TABLE XV
TONS CANE PER TON THEORETICAL 96° SUGAR FOR ESTATES BY CANE CLASS—1959 CROP

Estates	Fall plants	Spring plants	Standover spring	1st ratoons	2nd ratoons	3rd ratoons	Old cane	Average
Appleton	8·07	7·68	—	7·82	7·38	7·77	7·94	7·82
Barnett	9·88	8·46	—	8·31	8·27	8·30	8·16	8·32
Bernard Lodge	8·92	8·53	—	8·42	8·36	8·16	8·39	8·46
Caymanas	9·88	9·73	11·20	9·09	9·02	9·20	9·70	9·97
Frome	—	9·20	—	9·47	9·87	9·81	9·77	9·62
Gray's Inn Central	10·91	11·58	—	11·62	11·91	11·44	11·53	11·57
Hampden	9·36	9·88	—	8·97	8·87	8·96	9·07	9·19
Holland	8·65	9·80	8·99	8·35	8·70	8·93	8·87	9·25
Innswood	—	10·20	—	11·81	11·89	11·51	11·30	11·07
Jamaica Sugar Estates	10·04	10·49	—	9·26	9·19	9·03	9·55	9·56
Monymusk	—	10·06	11·41	10·01	10·65	10·14	10·08	10·30
New Yarmouth	9·10	9·92	—	9·22	9·25	8·94	9·03	9·08
Richmond/Llandovery	10·12	9·65	—	9·76	9·29	9·19	8·66	9·42
Rose Hall	—	9·15	—	9·18	9·17	9·21	9·38	9·26
Serge Island	8·67	7·84	—	7·87	7·57	7·62	7·82	7·89
Sevens	10·81	8·87	—	8·77	10·23	9·17	8·92	9·25
Trelawny Estates	11·02	10·10	12·13	9·82	9·98	10·05	9·85	9·96
United Estates	9·18	8·23	—	8·15	8·71	8·00	8·41	8·31
Worthy Park	—	8·17	—	7·61	7·71	7·31	7·32	7·50
Average	9·33	9·38	11·19	9·20	9·46	9·29	9·46	9·45

Note: Ratoon standover for Monymusk = 11·19 tons cane per ton sugar.

TABLE XVI
TONS THEORETICAL 96° SUGAR PER ACRE FOR ESTATES BY CANE CLASS—1959 CROP

Estates	Fall plants	Spring plants	Standover spring	1st ratoons	2nd ratoons	3rd ratoons	Old cane	Average
Appleton	4·52	3·78	—	3·51	3·59	3·56	3·40	3·68
Barnett	8·70	4·81	—	3·88	4·01	3·51	3·40	3·92
Barnard Lodge	3·64	3·71	—	3·66	2·98	3·07	3·41	3·40
Caymanas	5·31	4·00	5·12	3·85	3·54	3·67	3·32	3·95
Frome	—	4·44	—	4·20	3·96	3·88	3·46	3·94
Gray's Inn Central	3·34	2·83	—	2·45	2·36	2·71	2·65	2·62
Hampden	4·33	3·25	—	3·04	2·97	2·54	2·23	2·83
Holland	5·34	3·96	3·10	3·09	3·56	2·83	2·82	3·25
Innswood	—	4·50	—	2·90	2·87	2·91	2·61	3·01
Jamaica Sugar Estates	5·31	3·23	—	4·00	3·67	3·44	4·11	4·08
Monymusk	—	3·29	4·52	2·98	2·43	2·86	2·85	3·03
New Yarmouth	5·69	3·70	—	4·94	4·06	4·12	3·72	4·26
Richmond/Llandovery	5·09	3·39	—	3·30	3·23	2·86	3·12	3·33
Rose Hall	—	3·35	—	3·19	3·08	2·72	2·48	2·79
Serge Island	5·54	4·03	—	4·05	4·23	3·93	3·42	4·04
Sevens	4·37	4·41	—	3·71	4·01	3·01	3·70	3·89
Trelawny Estates	3·20	2·97	3·92	3·14	3·13	2·76	2·55	2·83
United Estates	5·52	4·99	—	4·40	4·21	4·15	3·68	4·26
Worthy Park	—	4·79	—	5·18	5·28	5·15	4·93	5·00
Average	4·58	3·88	4·38	3·58	3·32	3·37	3·17	3·49

Note: Ratoon standover for Monymusk = 3·56 tons sugar per acre.

TABLE XVII

PERCENTAGE ACREAGE REAPED IN EACH CANE CLASS FOR ESTATES AND ECOLOGICAL GROUPS AND AVERAGE LENGTH OF GROWTH IN MONTHS

Estates	Fall plants	Spring plants	Standover spring	1st ratoons	2nd ratoons	3rd ratoons	Old cane	Average length of growth in months
Appleton	15	12	—	13	13	19	28	11·76
Barnett	1	19	—	24	14	10	32	11·56
Frome	—	21	—	20	12	17	30	13·19
Holland	2	17	11	19	12	8	31	13·23
Wet West Estates ..	3	19	1	17	13	17	30	—
Hampden	10	13	—	20	9	6	42	13·99
Rose Hall	—	15	—	12	10	18	45	11·99
Trelawny Estates ..	2	16	1	23	6	12	40	11·68
Dry North Coast ..	5	15	—	20	8	11	41	—
Bernard Lodge	13	6	—	17	15	10	39	11·95
Caymanas	2	9	23	12	11	9	34	13·85
Innswood	—	18	—	8	4	7	63	13·33
Monymusk	—	14	10	18	10	13	34	12·39
New Yarmouth	15	2	—	11	7	24	41	13·11
Sevens	9	23	—	19	12	10	27	12·43
Irrigated Estates ..	3	13	8	16	11	12	37	—
Gray's Inn Central ..	2	9	—	13	15	10	51	10·73
Jamaica Sugar Estates ..	11	6	—	16	4	10	53	13·52
Richmond/Llandovery ..	8	9	—	28	22	13	20	11·48
Serge Island	8	18	—	33	7	13	21	12·51
Wet East Estates ..	8	10	—	21	11	11	39	—
United Estates	2	14	—	26	16	17	25	11·97
Worthy Park	—	13	—	17	7	12	51	13·23
Central Estates	1	14	—	23	13	16	33	—
Overall Average ..	4	14	4	18	11	13	36	—
Average length of growth in months	16·38	13·22	18·35	12·04	11·95	12·04	11·98	12·58

TABLE XVIII
CWT. THEORETICAL 96° SUGAR PER ACRE PER MONTH FOR ESTATES BY CANE CLASS—1959 CROP

Estates	Fall plants	Spring plants	Standover spring	1st ratoons	2nd ratoons	3rd ratoons	Old cane	Average
Appleton	5.50	6.48	—	7.02	6.80	6.29	6.17	6.26
Barnett	9.87	8.06	—	6.87	7.13	6.14	5.88	6.78
Bernard Lodge .. .	6.04	5.69	—	6.16	5.05	5.13	5.77	5.69
Caymanas	5.48	6.50	4.99	6.23	5.97	6.16	5.93	5.70
Frome	—	6.33	—	6.44	5.94	5.85	5.50	5.98
Gray's Inn Central .. .	4.25	4.75	—	4.17	4.36	6.42	5.09	4.89
Hampden	4.74	4.26	—	4.66	4.38	4.01	3.36	4.03
Holland	5.43	6.28	2.95	5.45	5.80	4.73	4.71	4.91
Innswood	—	5.69	—	5.00	4.73	4.56	4.03	4.52
Jamaica Sugar Estates .. .	5.56	5.34	—	5.92	5.40	5.72	6.40	6.03
Monymusk	—	5.10	5.28	5.14	4.23	4.86	4.89	4.90
New Yarmouth	7.12	5.29	—	6.91	7.17	6.55	6.02	6.50
Richmond/Llandovery .. .	5.43	5.95	—	6.07	5.83	5.44	5.82	5.81
Rose Hall	—	5.35	—	5.16	5.11	4.61	4.20	4.66
Serge Island	6.69	6.43	—	6.64	6.93	6.67	5.75	6.45
Sevens	4.73	7.13	—	6.54	7.35	5.01	6.11	6.26
Trelawny Estates	4.25	4.44	3.81	5.49	5.49	4.89	4.61	4.85
United Estates	7.47	8.19	—	7.33	7.07	7.04	6.25	7.11
Worthy Park	—	6.74	—	8.01	7.93	7.97	7.49	7.56
Average	5.59	5.86	4.77	5.95	5.55	5.59	5.29	5.54

Note: Ratoon standover for Monymusk = 4.17.

TABLE XIX
DISTRIBUTION OF FERTILIZERS
ACRES FERTILIZED % TOTAL ACRES REAPED FOR PLANTS AND RATOONS BY ECOLOGICAL GROUPS 1955-1959

Groups	NITROGEN		PHOSPHATE		POTASH	
	Plants	Ratoons	Plants	Ratoons	Plants	Ratoons
1955						
Wet West	96	98	41	13	94	95
North Coast	100	99	2	8	17	17
Irrigated	100	96	24	8	59	33
Wet East	100	99	1	1	77	72
Central	100	99	2	25	100	80
1956						
Wet West	98	99	28	13	97	96
North Coast	99	98	—	2	71	23
Irrigated	99	100	2	3	20	15
Wet East	88	98	11	10	51	41
Central	100	98	43	25	100	94
1957						
Wet West	91	97	22	12	86	95
North Coast	100	98	—	2	81	83
Irrigated	94	100	—	—	21	25
Wet East	95	98	1	11	50	38
Central	99	94	79	35	98	75
1958						
Wet West	96	98	18	8	94	97
North Coast	97	97	5	12	96	97
Irrigated	100	99	—	1	16	19
Wet East	93	100	36	14	57	41
Central	99	99	53	44	96	97
1959						
Wet West	98	99	28	18	96	97
North Coast	98	100	12	17	98	100
Irrigated	98	100	4	2	22	22
Wet East	85	98	22	12	54	46
Central	100	100	93	54	82	92

TABLE XX
PERCENTAGE ACREAGE FERTILIZED WITH NITROGEN FOR EACH CANE CLASS 1955-59

Crop year	PLANTS		Mean	RATOONS			
	Fall	Spring		1st	2nd	3rd	Old
1955	97	99	98	98	99	98	98
1956	96	99	98	100	99	99	98
1957	96	94	95	99	99	99	98
1958	99	97	98	99	99	99	98
1959	90	98	94	99	99	99	99

TABLE XXI
AVERAGE N, P₂O₅, K₂O APPLICATIONS FOR PLANTS AND RATOONS BY ECOLOGICAL GROUPS 1955-59
(lb. per acre)

Groups		1955			1956			1957			1958			1959		
		N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
Wet West	Plants	56	45	99	48	36	73	62	30	96	61	46	97	71	47	111
	Ratoons	60	31	94	49	26	82	61	28	94	65	40	95	65	36	87
North Coast	Plants	32	11	81	36	—	73	41	—	82	44	16	101	36	44	91
	Ratoons	32	12	83	32	45	70	38	20	88	40	16	94	38	44	81
Irrigated	Plants	101	19	78	105	56	89	97	—	76	100	—	81	93	61	88
	Ratoons	100	19	71	97	52	96	102	54	95	101	49	95	99	27	98
Wet East	Plants	78	21	77	68	32	76	77	33	108	70	75	108	74	49	78
	Ratoons	87	28	81	77	31	91	79	23	88	84	66	96	78	40	72
Central	Plants	72	28	87	71	32	85	56	39	88	75	27	87	70	30	84
	Ratoons	64	27	90	71	26	93	72	39	88	76	21	88	76	27	95

APPENDIX II

EXPERIMENT DATA

PART I

RESULTS OF FERTILIZER EXPERIMENTS

A summary of the results of the fertilizer experiments reaped in 1959 is presented below. Actual yields, in tons cane per acre, % sucrose or Pol% cane and tons sugar per acre or tons pol per acre obtained by control are quoted, and yields obtained from the various levels of fertilizer are expressed as a percentage of control. The variety used in each experiment is also noted.

N.B.—The term "cut back" used in the case of certain fall plant experiments indicates that although planted in the fall of a particular year the cane was reaped the *following* crop, thus shortening the usual growing period.

(a) FORMAL AND DISPERSED BLOCK EXPERIMENTS

	Cwt. per acre									S.E. % g.m.	Significant difference			
	Sulphate of ammonia (N)			18% superphosphate (P)			Muriate of potash (K)				(N)	(P)	(K)	
1. Frome—Black Heath—Chapman (3x3x3 NPK) (B4362)														
			0	2	4		0	3	6		0	1½	3	
Spring Plants														
Cane	..	..	19.9	123	136		23.7	101	101		23.5	103	101	9.2 11.0 — —
Sucrose	..	..	6.4	100	93		6.7	105	105		6.5	101	98	5.3 5.5 — —
Sugar	..	..	3.1	123	128		3.5	105	106		3.6	105	100	8.6 10.2 — —
1st Ratoons														
Cane	..	..	29.8	120	117		34.4	97	96		31.8	108	109	8.4 9.5 — —
Sucrose	..	..	15.6	105	102		16.2	98	97		15.9	102	99	6.4 — —
Sugar	..	..	4.7	126	119		5.6	95	94		5.1	109	109	10.1 12.0 — —
2. United Estates—Windsor Park—Worcester 12 (3x3x3 NPK) (B4362)														
			0	2	4		0	1	2		0	1	2	
Fall Plants														
Cane	..	..	69.1	99	96		68.2	99	100		66.7	100	105	10.4 — —
Sucrose	..	..	12.1	98	92		11.6	103	100		11.6	99	102	6.8 — —
Sugar	..	..	8.3	97	88		7.9	102	101		7.8	99	107	14.2 — —
1st Ratoons														
Cane	..	..	39.9	96	103		40.5	98	96		37.6	109	108	13.6 — —
Sucrose	..	..	12.3	110	107		13.2	98	99		13.7	96	88	12.7 — —
Sugar	..	..	4.9	107	110		5.4	96	94		5.2	105	95	19.3 — —
3. United Estates—Windsor Park—Worcester 14 (3x3x3 NPK) (B4362)														
			0	2	4		0	1	2		0	1	2	
Fall Plants														
Cane	..	..	55.5	109	112		56.3	109	106		58.3	101	104	8.4 — —
Sucrose	..	..	13.2	102	100		14.0	93	91		12.9	104	105	5.3 — —
Sugar	..	..	7.3	111	112		7.9	102	96		7.5	105	109	10.1 10.9 — —
1st Ratoons														
Cane	..	..	26.9	114	128		29.5	107	105		29.8	102	107	7.4 8.5 — —
Sucrose	..	..	11.8	103	97		11.8	100	99		11.5	104	104	10.3 — —
Sugar	..	..	3.2	117	124		3.5	108	103		3.4	107	110	9.1 10.4 — —

(b) MISCELLANEOUS FERTILIZER EXPERIMENTS

(i) TYPES OF NITROGEN

1. Appleton—Appleton—Sampson Gate II (Sulphate of ammonia vs. Urea) (B41227)							
Sulphate of ammonia				Urea		S.E. % g.m.	Significant difference
	0	1½	3	0.68	1.36		
Spring Plants							
Cane	26.1	114	125	109	125	7.4	11.7
Sucrose	12.2	102	100	100	101	3.2	—
Sugar	3.2	116	126	109	127	8.0	16.4
1st Ratoons							
Cane	34.7	110	114	110	117	3.6	5.4
Sucrose	13.9	95	87	93	94	7.2	—
Sugar	4.8	105	100	102	110	4.5	6.4
2nd Ratoons							
Cane	21.3	117	146	117	132	10.5	17.6
Sucrose	14.6	99	95	99	99	3.7	—
Sugar	3.1	116	138	113	130	9.7	16.1
2. Appleton—Appleton—Thompson Piece (4x4 F.P.M. vs. P ₂ O ₅ + S/A) (B4362)							
Sulphate of ammonia				Urea		S.E. % g.m.	Significant difference
	1	2	3	4			
Spring Plants							
Cane	31.7	122	115	105			
1 = Control 2 = 2½ cwt. 40 superphosphate + 3 cwt. S/A per acre 3 = 2 cwt. 18:50 Diammonium phosphate + 1 cwt. S/A per acre 4 = 5 tons filter press mud per acre							
3. Appleton—Raheen—Union Bridge (3x5 sulphate of ammonia) (B4362)							
Sulphate of ammonia				Urea		S.E. % G.M.	Significant difference
	1	2	3	4	5		
Spring Plants							
Cane	33.6	129	145	125	130	16.3	—
Sucrose	13.7	99	100	98	104	3.2	—
Sugar	4.8	126	141	121	133	16.3	—
1 = No sulphate of ammonia 2 = 2½ cwt. S/A per acre applied at 6 weeks old 3 = 5 cwt. S/A per acre applied at 6 weeks old 4 = 2½ cwt. S/A per acre applied at 6 weeks old + 1 cwt. S/A per acre applied at 24 weeks old 5 = 5 cwt. S/A per acre applied at 6 weeks old + 1 cwt. S/A per acre applied at 24 weeks old							
4. Barnett—Bogue—Hardtime 3 (Sulphate of ammonia vs. Urea) (B41227)							
Sulphate of ammonia				Urea		S.E. % g.m.	Significant difference
	0	2	4	0.9	1.8		
Spring Plants							
Cane	36.4	95	95	104	103	6.6	—
Sucrose	11.6	104	112	112	100	7.2	10.4
Sugar	4.2	98	108	116	104	10.9	—
1st Ratoons							
Cane	24.1	108	115	116	117	13.2	—
2nd Ratoons							
Cane	30.5	104	110	111	108	12.4	—
Sucrose	11.6	99	84	95	96	5.7	7.5
Sugar	3.5	103	94	106	104	12.5	—
5. Barnett—Catherine Mt.—Boiling House (Sulphate of ammonia vs. Urea) (B4362)							
Sulphate of ammonia				Urea		S.E. % g.m.	Significant difference
	0	2	4	0.9	1.8		
Spring Plants							
Cane	33.1	98	101	94	99	5.7	—
Sucrose	13.0	100	96	101	102	6.9	—
Sugar	4.3	97	97	94	101	6.0	—
1st Ratoons							
Cane	25.5	100	103	108	113	8.8	—
2nd Ratoons							
Cane	21.3	117	123	114	120	15.0	—
Sucrose	14.0	96	95	99	98	7.7	—
Sugar	3.0	111	115	116	111	15.2	—
6. Bernard Lodge—Congrieve 36 (Sulphate of ammonia) (B42231)							
Sulphate of ammonia				Urea		S.E. % g.m.	Significant difference
	1	2	3	4	5		
Fall Plants							
Cane	56.4	93	91	87	94	19.7	—
Sucrose	10.9	92	100	101	93	7.0	—
Sugar	6.1	86	91	88	86	19.6	—
1 = Control. No fertilizer 2 = S/A 3 cwt. per acre on surface—6 weeks after planting 3 = S/A 3 cwt. per acre, dibbled—6 weeks after planting 4 = S/A 2 cwt. per acre on surface—6 weeks after planting 5 = S/A 2 cwt. per acre, dibbled—6 weeks after planting + 1 cwt. S/A per acre on surface—6 months after planting.							
7. Caymanas—Farm II—Section 9 (Sulphate of ammonia vs. Urea) (B4362)							
Sulphate of ammonia				Urea		S.E. % g.m.	Significant difference
	Control	3 cwt. S/A per acre		Low Biuret 3 cwt./acre	High Biuret 3 cwt./acre		
Spring Plants							
Cane	45.2	103		94	96	5.2	—
1st Ratoons							
Cane	17.5	119		102	113	14.9	—
Sucrose	15.3	97		94	97	4.0	—
Sugar	2.7	115		96	111	15.8	—

8. Frome—Shrewsbury—Cambridge (N and K Trace Elements) (B4362)

	1	2	3	4	5	6	S.E. % g.m.	Significant difference
Spring Plants								
Cane	40.1	96	95	97	96	98	5.6	—
Sucrose	12.9	102	106	103	104	94	8.0	—
Sugar	5.2	98	101	100	99	93	9.3	—
	1 = Normal method of N. Application — No trace element							
	2 =	"	"	"	— +	"		
	3 = Dibbling	"	"	"	— No	"		
	4 =	"	"	"	— +	"		
	5 = Broadcast	"	"	"	— No	"		
	6 =	"	"	"	— +	"		
1st Ratoons								
Cane	41.2	97	99	96	104	98	7.7	—
Sucrose	15.4	94	93	93	95	93	5.5	—
Sugar	6.4	91	92	89	100	92	9.3	—

9. Innswood—Gladstone 9 (Time of Application of N) (B41227)

	1	2	3	4	5	6	7	8	S.E. % g.m.	Significant difference
Spring Plants										
Cane	49.3	108	101	96	99	99	107	106	6.9	—
Sucrose	12.2	90	89	94	88	94	91	95	10.0	—
Sugar	6.0	95	91	91	87	93	98	100	10.5	—
	1 = Control									
	2 = 2 cwt. S/A per acre applied at 6 weeks + cwt. S/A per acre at 15 weeks									
	3 = 2	"	"	"	"	"	"	"	24	"
	4 = 3	"	"	"	"	"	"	"	15	"
	5 = 4	"	"	"	"	"	"	"	24	"
	6 = 4	"	"	"	"	"	"	"	15	"
	7 = 2	"	"	"	"	"	"	"	24	"
	8 = 6	"	"	"	"	"	"	"	24	"

10. Innswood—St. Helens 16 (S/A vs. Urea) (B41227)

	Control	2 cwt. S/A per acre	Low biuret urea 2 cwt. S/A per acre	High biuret urea 2 cwt. S/A per acre	S.E. % g.m.	Significant difference
Spring Plants						
Cane	50.3	97	105	107	12.9	—
Sucrose	8.2	105	99	108	6.6	—
Sugar	4.2	100	103	116	16.4	—

11. Jamaica Sugar Estates—Wheelerfield—Section 22 (Sulphate of ammonia vs. Urea)

	Sulphate of ammonia		Urea		S.E. % g.m.	Significant difference
	0	2	2	2		
Spring Plants						
Cane	50.1	100	103	100	9.7	—
1st Ratoons						
Cane	39.0	104	106	100	3.8	8.5
Sucrose	12.1	91	102	91	6.8	15.3
Sugar	4.7	94	109	91	7.0	15.3

12. Monymusk—Exeter—Exeter 14 (Sulphate of ammonia) (B41227)

	1	2	3	4	5	S.E. % g.m.	Significant difference
Spring Plants							
Cane	41.3	93	100	102	100	8.0	—
Sucrose	7.8	83	83	88	95	25.9	—
Sugar	3.2	75	82	91	97	38.0	—
1st Ratoons							
Cane	36.1	98	96	102	90	13.8	—
Sucrose	9.0	101	102	86	99	5.8	—
Sugar	3.2	99	99	88	91	14.0	—

* Figures in bracket } 1 = (3) Normal } applied 6 weeks after planting
= cwt. S/A per acre } 2 = (3) Dibbled }
} 3 = (3) Broadcast }
} 4 = (3) Broadcast + (2) Normal: Broadcast application S/A 6 weeks after planting + 2 cwt. S/A applied normally at 5 months old
} 5 = (2) Broadcast + (3) Normal: Normal application 6 weeks after planting + (2) S/A applied Broadcast at 5 months old

13. Monymusk—Exeter—Section 65 (Sulphate of ammonia vs. Urea) (B41227)

	Sulphate of ammonia			Urea		S.E. % g.m.	Significant difference
	0	3	6	1½	3		
Spring Plants							
Cane	75.9	102	103	99	109	9.3	—
Sucrose	9.6	97	98	91	92	11.6	—
Sugar	7.3	97	99	89	99	10.5	—
1st Ratoons							
Cane	68.5	87	82	80	85	13.7	—
Sucrose	8.3	83	88	100	108	17.7	—
Sugar	5.6	74	71	86	95	21.5	—
2nd Ratoons							
Cane	37.5	108	124	113	101	9.4	14.1
Sucrose	8.7	112	114	108	107	7.8	—
Sugar	3.3	121	141	124	109	16.2	25.0

14. Caymanas—Caymanas—"V" Piece (3x2x2 NPKT) (B42231)

	N ₀	N ₁	N ₂	P ₀	P ₁	K ₀	K ₁	T ₀	T ₁	S.E. % g.m.	Significant difference
Standover Spring Plants											
Cane	72.3	95	104	69.1	109	70.5	105	74.8	93	8.1	8.4
Sucrose	11.8	107	104	12.5	96	12.4	97	12.4	96	9.9	—
Sugar	8.5	103	109	8.6	105	8.7	102	9.3	89	8.4	7.9
1st Ratoons											
Cane	49.0	87	99	44.3	111	45.2	107	47.9	95	13.2	—
Sucrose	13.5	106	99	13.6	102	14.1	95	14.0	96	16.1	—
Sugar	6.6	93	99	6.0	114	6.4	102	6.7	91	26.0	—

15. Caymanas—Caymanas—"N" Piece (3x2x2x2 NPKT) (B42331)

	N ₀	N ₁	N ₂	P ₀	P ₁	K ₀	K ₁	T ₀	T ₁	S.E. % g.m.	Significant difference
Standover Spring Plants											
Cane	76.6	90	98	73.5	100	73.7	99	76.6	92	15.8	—
Sucrose	9.2	95	99	9.3	94	8.9	104	9.0	101	9.8	—
Sugar	7.1	86	98	6.9	94	6.6	103	6.9	92	22.4	—
1st Ratoons											
Cane	42.2	95	95	40.7	103	40.5	104	40.3	105	17.0	—
Sucrose	14.9	100	99	14.7	99	14.4	104	14.4	104	4.9	—
Sugar	6.3	94	94	6.0	102	5.8	108	6.8	109	16.4	—

16. Caymanas—Caymanas—Lagoon 6 (3x2x2x2 NPKT) (B42231)

	N ₀	N ₁	N ₂	P ₀	P ₁	K ₀	K ₁	T ₀	T ₁	S.E. % g.m.	Significant difference
Standover Spring Plants											
Cane	68.6	100	96	68.0	98	68.7	96	68.2	98	14.0	—
Sucrose	11.5	97	95	11.1	100	11.0	103	9.0	101	14.7	—
Sugar	7.8	96	91	7.6	97	7.5	99	6.9	92	24.1	—
1st Ratoons											
Cane	41.6	97	105	42.9	95	43.0	94	42.3	98	15.5	—
Sucrose	12.5	95	93	11.9	102	11.9	102	11.9	102	11.2	—
Sugar	5.1	94	100	5.0	100	5.1	95	5.0	99	18.9	—

17. Richmond/Llandovery—Llandovery—Alligator Hole (N-source/placement) (B41227)

	Control	Sulphate ammonia 2 cwt. per acre	Nitrate of soda 2.62 cwt. per acre	Urea 0.81 cwt. per acre	Ammophos 1 cwt. + 1.12 cwt. S/A per acre	S.E. % g.m.	Significant difference
Spring Plants							
Cane { Surface		143	133	137	103		
{ Buried	35.8	123	135	134	101	19.1	—
Sucrose { Surface		97	96	106	103		
{ Buried	11.1	109	95	101	111	6.4	9.5
Sugar { Surface		137	128	144	106		
{ Buried	4.0	133	128	123	112	16.6	—
1st Ratoons							
Cane { Surface		116	108	112	114		
{ Buried	38.8					16.3	—
2nd Ratoons							
Cane { Surface		80	87	88	96		
{ Buried	38.3	96	96	80	90	16.8	—
Sucrose { Surface		104	97	102	106		
{ Buried	10.7	106	103	104	105	6.2	—
Sugar { Surface		84	86	89	103		
{ Buried	4.1	102	99	84	94	16.6	—

18. Vale Royal—Swanswick—Breeze Mill Common (3x2x2x2 Fertilizer x Trace element) (B4362)

	a ₀	a ₁	a ₂	b ₀	b ₁	c ₀	c ₁	d ₀	d ₁	S.E. % g.m.	Significant difference
Cane											
Fall Plants											
Cane	15.4	120	133	17.9	102	17.3	109	17.2	110	27.2	18.5
Sucrose	13.0	100	98	12.9	100	13.1	97	12.8	102	9.4	—
Sugar	2.0	120	132	2.3	102	2.3	107	2.2	111	80.0	20.3
1st Ratoons											
Cane	16.9	106	113	18.3	96	18.0	100	17.5	105	15.6	9.6
Sucrose	13.1	98	99	12.9	100	13.0	98	12.9	100	5.0	—
Sugar	2.2	104	112	2.4	96	2.3	98	2.3	105	17.2	—

a₀ .. No superphosphate
 a₁ .. 1 cwt. per acre triple superphosphate applied at base of plants
 a₂ .. 2 cwt. per acre triple superphosphate applied at base of plants
 b₀ .. 1 cwt. S/A x 2 cwt. per acre M/K applied at surface early in crop.
 b₁ .. 2 cwt. S/A per acre applied later in crop.
 c₀ .. No marl
 c₁ .. 18 tons marl
 d₀ .. No trace element
 d₁ .. Trace elements applied early in plant cane crop only at following rates per acre:—
 100 lb. per acre magnesium sulphate
 100 " " " manganese "
 50 " " " copper "
 30 " " " borax "
 20 " " " zinc sulphate
 1 " " " sodium molybdate

(ii) ARTIFICIAL AND ORGANIC AND LIMING EXPERIMENTS

1. Frome—Belle Isle—Meylersfield—Lime Kiln (Bagasse, knifing and nitrogen) (B41227)

	Tons per acre bagasse				Knifing		Cwt. per acre Sulphate of ammonia		S.E. % g.m.		Significant difference		
	0	10	20	30	0	1	3	6	A	B	B	K	N
Fall Plants													
Cane	38.1	91	90	82	30.9	124	31.7	118	15.5	10.2	—	10.8	6.8
Sucrose	13.9	98	101	100	14.0	99	14.0	99	3.9	2.8	—	—	—
Sugar	5.3	90	91	82	4.3	122	4.4	116	13.1	3.6	10.4	9.0	2.5
1st Ratoons													
Cane	43.0	100	103	100	42.7	103	41.0	112	6.9	6.5	—	—	4.4
Sucrose	13.5	100	100	100	13.4	101	13.7	98	3.3	3.9	—	—	2.4
Sugar	5.8	100	103	100	5.7	105	5.6	109	6.4	6.7	—	3.7	4.1
2nd Ratoons													
Cane	40.2	100	103	99	39.1	107	39.4	105	10.5	9.9	—	6.7	—
Sucrose	13.9	98	101	100	14.0	99	14.0	99	3.9	2.8	—	—	—
Sugar	5.6	98	104	98	5.6	102	5.4	108	11.4	11.0	—	—	7.0
3rd Ratoons													
Cane	40.4	105	104	108	41.3	104	40.1	110	11.5	7.0	—	—	4.4
Sucrose	7.8	102	102	102	7.8	104	7.6	99	6.5	7.2	—	3.9	—
Sugar	5.3	106	105	109	5.3	109	5.3	110	10.3	9.7	—	6.7	6.1
4th Ratoons													
Cane	39.5	100	103	99	38.8	105	40.1	99	13.1	9.3	—	—	—
Sucrose	10.9	100	97	106	10.7	95	11.3	105	15.7	8.0	—	—	—
Sugar	4.4	99	102	105	4.2	110	4.5	94	14.8	12.7	—	9.6	—

2. Frome—Masemure—Albany—Cotton Tree (Liming, bagasse, N, knifing, cross knifing) (B41227)

	Tons per acre bagasse			Knifing		Cwt. per acre Sulphate of ammonia		Liming		S.E. % g.m.			Significant difference			
	0	15	30	1	2	3	6	0	1	B	K	N	B	K	N	L
Spring Plants																
Cane	40.8	95	90	39.5	96	37.2	108	37.7	100	7.6	8.2	9.2	6.8	—	5.1	—
Sucrose	12.4	98	96	12.1	101	12.1	101	12.4	99	7.6	6.8	5.3	—	—	—	—
Sugar	5.1	92	87	4.8	97	4.5	110	4.7	99	11.5	12.8	9.9	10.1	—	5.5	—
1st Ratoons																
Cane	56.0	99	98	56.8	95	54.6	103	54.2	99	10.5	6.6	9.4	—	4.6	—	—
Sucrose	11.9	91	93	11.2	100	11.2	101	11.5	96	9.0	4.3	9.9	9.0	—	—	—
Sugar	6.7	90	91	6.4	95	6.1	103	6.3	95	12.2	5.6	12.8	10.8	3.9	—	—
2nd Ratoons																
Cane	48.5	99	99	48.7	98	48.1	100	48.3	99	13.9	7.4	12.7	—	—	—	—
Sucrose	7.6	100	99	7.6	101	7.4	96	7.4	103	4.7	4.2	3.2	—	—	1.7	—
Sugar	6.4	99	97	6.4	99	6.5	96	6.5	97	12.2	9.4	12.7	—	—	—	—
3rd Ratoons																
Cane	48.3	100	98	49.3	95	46.7	106	46.4	103	10.2	9.1	14.5	—	—	—	—
Sucrose	11.8	103	97	11.6	104	12.1	95	12.2	98	8.6	9.6	7.4	—	—	4.0	—
Sugar	5.7	103	96	5.8	98	5.7	101	5.7	100	14.1	11.9	14.8	—	—	—	—

3. Frome—Masemure—Albany—Old Town (Liming, bagasse, N, knifing, cross knifing) (B41227)

	Tons per acre bagasse			Knifing		Cwt. per acre Sulphate of ammonia		Liming		S.E. % g.m.			Significant difference			
	0	15	30	1	2	3	6	0	1	B	K	N	B	K	N	
Spring Plants																
Cane	36.9	97	89	34.2	106	34.1	106	36.1	97	15.3	8.8	10.5	9.3	—	—	—
Sucrose	11.7	104	103	12.1	98	11.9	103	12.1	100	6.0	7.0	5.5	—	—	—	—
Sugar	4.4	101	91	4.2	104	4.1	108	4.4	98	15.7	13.5	12.7	—	—	—	—
1st Ratoons																
Cane	64.0	102	100	54.2	100	52.0	109	54.7	99	5.4	8.3	9.0	—	—	—	5.0
Sucrose	11.8	100	103	12.0	100	12.1	97	11.8	102	6.7	2.1	6.4	—	—	—	—
Sugar	6.4	101	103	6.5	99	6.3	106	6.5	101	8.4	8.2	11.2	—	—	—	—
2nd Ratoons																
Cane	48.9	105	102	48.5	106	47.3	112	51.6	94	10.0	10.4	8.8	—	—	—	5.0
Sucrose	7.1	99	101	7.1	100	7.0	98	7.2	98	4.7	4.9	3.5	—	—	—	1.8
Sugar	6.9	103	103	6.9	106	6.7	110	7.2	96	13.7	11.2	9.6	—	—	—	5.3
3rd Ratoons																
Cane	50.6	99	100	50.1	101	47.5	112	52.1	94	8.2	10.9	12.4	—	—	—	7.0
Sucrose	11.3	101	101	11.4	101	11.6	98	11.4	101	9.3	8.9	11.3	—	—	—	—
Sugar	5.8	100	101	5.7	102	5.5	110	6.0	94	11.4	14.0	15.6	—	—	—	8.7

4. Innswood—St. Helen's—Section 9c (B41227)

	Tons bagasse per acre				S.E. % g.m.		Significant difference		
	0	10	20	30					
Standover Spring									
Cane	71.7	105	101	96	10.3	—			
Sucrose	10.1	106	100	98	9.4	—			
Sugar	7.3	110	101	94	15.1	—			
1st Ratoons									
Cane	50.8	107	102	97	5.5	—			
Sucrose	12.3	95	96	97	6.3	—			
Sugar	6.3	101	99	95	10.3	—			
2nd Ratoons									
Cane	41.6	105	104	105	5.2	—			
3rd Ratoons									
Cane	39.4	106	100	98	4.1	—			

5. Sevens—Parnassus—Section 90a (Liming)

	0	10	20	S.E. % g.m.	Significant difference
Spring Plants					
Cane	54.0	113	95	11.0	—
Sucrose	10.0	98	104	5.4	—
Sugar	5.4	111	98	14.5	—
1st Ratoons					
Cane	33.3	118	100	3.4	3.6
Sucrose	13.1	96	97	6.0	—
Sugar	4.3	111	98	7.3	7.4
Line applied at 10 and 20 tons marl per acre					
2nd Ratoons					
Cane	36.8	103	105	10.8	—
Sucrose	9.7	105	108	4.3	4.4
Sugar	8.6	111	114	14.1	—
Line applied at 20 tons per acre					

6. Worthy Park—Rod wood Hole—Section 3 (Filter Press mud)

	1	2	3	4	5	6	7	8	9	S.E. % g.m.	Significant difference
Spring Plants											
Cane	31.2	167	151	149	137	151	128	120	118	6.6	12.7
Sucrose	13.4	96	99	97	97	97	99	99	97	3.8	—
Sugar	4.2	150	150	145	133	147	126	118	115	6.6	12.5
1st Ratoons											
Cane	29.7	146	148	152	140	147	145	140	134	6.0	20.4
Sucrose	15.1	96	97	95	99	93	97	98	98	—	—
Sugar	4.5	141	143	144	138	137	140	136	132	—	—
1 ..	Control										
2 ..	Filter press mud fortified 10 tons per acre										
3 ..	" " " " " 5 " " "										
4 ..	" " " " normal 10 " " "										
5 ..	" " " " " 5 " " "										
6 ..	4 cwt. triple superphosphate + 3 cwt. S/A per annum										
7 ..	1 " " " " + 3 " " " "										
8 ..	Crushed marl 20 tons per acre + 3 " " " "										
9 ..	" " 10 " " " + 3 " " " "										

(c) FERTILIZER CONTROL PLOTS

Frome Estate

Responses to extra N, P, K
 Normal time of N application Late time of N application

					Control yield	N %	P %	K %	N %	P %	K %
1. Albany—Cabbage Tree											
Cane	..	..	..	..	35.7	4	9	15	11	5	19
Sucrose	..	..	..	..	14.7	-1	11	12	-5	5	19
Sugar	..	..	..	..	5.24	1	-1	0.3	2	0.2	0.02
2. Albany—Cotton Tree											
Cane	..	..	..	..	38.9	11	13	8	2	6	16
Sucrose	..	..	..	..	13.1	-5	-1	-7	-10	-2	-6
Sugar	..	..	..	..	5.09	2	1	2	1	1	2
3. Albany—New Murray											
Cane	..	..	..	..	27.6	18	0.03	-4	23	-2	-2
Sucrose	..	..	..	..	15.6	-1	4	-5	7	1	-3
Sugar	..	..	..	..	4.30	2	-0.4	0.1	2	-0.3	-0.04
4. Barham—Jackass Paddock											
Cane	..	..	..	..	59.7	-7	5	-5	-5	1	-1
Sucrose	..	..	..	..	14.0	17	5	11	8	-1	-5
Sugar	..	..	..	..	8.34	-20	1	7	-12	3	4
5. Barham—Sinkhole											
Cane	..	..	..	..	39.4	32	19	9	21	23	7
Sucrose	..	..	..	..	12.2	7	-3	2	8	10	-10
Sugar	..	..	..	..	4.78	23	24	7	13	12	20
6. Barham—Top River Head No. 1											
Cane	..	..	..	..	39.8	1	-2	-12	9	-9	-3
Sucrose	..	..	..	..	10.6	18	8	-17	-0.3	-2	-9
Sugar	..	..	..	..	4.21	-16	-7	5	10	-7	6
7. Barham—Top River Head No. 2											
Cane	..	..	..	..	30.0	6	4	1	16	4	1
Sucrose	..	..	..	..	9.5	8	18	-27	-2	-6	-8
Sugar	..	..	..	..	2.84	4	-12	37	17	9	9
8. Belle Isle—Fontabelle Piece											
Cane	..	..	..	..	60.2	-10.2	-5	1	-20	0.20	-3
Sucrose	..	..	..	..	13.5	6	3	1	7	7	-2
Sugar	..	..	..	..	8.11	-15	-7	0.01	-25	-6	-2
9. Belle Isle—Labbo											
Cane	..	..	..	..	51.4	3	5	10	-15	1	11
Sucrose	..	..	..	..	14.7	12	5	-6	26	-9	8
Sugar	..	..	..	..	7.54	-8	1	12	-32	10	5
10. Belle Isle—Plantain Walk											
Cane	..	..	..	..	47.7	6	-0.3	-12	-1	1	-14
Sucrose	..	..	..	..	14.8	-1	2	-4	-6	7	5
Sugar	..	..	..	..	7.03	7	-2	-8	-2	8	-18
11. Belle Isle—Stone Piece											
Cane	..	..	..	..	54.0	2	-10	5	-5	-3	-3
Sucrose	..	..	..	..	13.7	2	1	8	4	11	4
Sugar	..	..	..	..	7.39	1	-12	14	-8	8	-6
12. Blackheath—Ballard											
Cane	..	..	..	..	51.8	8	-2	-9	5	-10	-2
Sucrose	..	..	..	..	13.5	-6	-6	-0.43	2	-3	-3
Sugar	..	..	..	..	7.00	16	4	-8	4	-7	2
13. Blackheath—Cuntu Walk											
Cane	..	..	..	..	42.8	-10	3	-2	-6	3	-2
Sucrose	..	..	..	..	11.4	-10	-1	0.30	1	6	-6
Sugar	..	..	..	..	4.37	5	10	3	-2	3	11

		Responses to extra N, P, K						
		Control yield	Normal time of N application			Late time of N application		
			N %	P %	K %	N %	P %	K %
14. Blackheath—Fyffe Piece								
Cane	.. .. .	52.4	-12	30	-10	15	19	-4
Sucrose	.. .. .	13.0	-4	-1	-2	4	4	-7
Sugar..	.. .. .	6.80	-8	31	-9	10	18	3
15. Blackheath—Georges Ground								
Cane	.. .. .	54.5	-7	0.39	-4	-7	2	-6
Sucrose	.. .. .	13.4	0.35	-12	6	14	12	-16
Sugar..	.. .. .	7.29	-7	12	-9	-18	-7	10
16. Blackheath—Horse Table								
Cane	.. .. .	48.7	-8	-11	18	-5	-10	15
Sucrose	.. .. .	12.2	18	29	-11	9	9	6
Sugar..	.. .. .	5.92	-17	-31	14	-14	-19	7
17. Blackheath—Kinlocke								
Cane	.. .. .	95.1	5	-1	-12	-8	3	-16
Sucrose	.. .. .	10.3	5	2	-11	10	9	17
Sugar..	.. .. .	9.77	0.10	-3	-1	-8	-4	-0.5
18. Blackheath—Newland No. 2								
Cane	.. .. .	35.3	31	2	17	34	10	33
Sucrose	.. .. .	6.2	142	-46	54	82	54	-49
Sugar..	.. .. .	2.18	-41	96	9	-9	-23	129
19. Blackheath—Newland No. 4								
Cane	.. .. .	71.5	7	-2	11	4	0.3	7
Sucrose	.. .. .	6.60	-13	20	64	-29	39	51
Sugar..	.. .. .	4.68	15	-13	-32	34	-20	-23
20. Blackheath—Newland No. 10								
Cane	.. .. .	50.8	10	-3	15	1	9	7
Sucrose	.. .. .	9.3	-0.52	29	16	10	-2	50
Sugar..	.. .. .	4.71	8	-21	1	-6	9	-28
21. Blackheath—Oliver								
Cane	.. .. .	50.2	-3	-4	-9	4	-2	-10
Sucrose	.. .. .	15.2	1	-0.15	-2	6	3	-5
Sugar..	.. .. .	7.63	-4	-4	-7	-2	-4	-6
22. Blackheath—Road Piece								
Cane	.. .. .	61.6	8	-18	-3	0.31	-15	-7
Sucrose	.. .. .	11.4	1	3	-14	1	-9	-9
Sugar..	.. .. .	7.03	8	7	13	-0.27	-6	1
23. Blue Castle—Barracks								
Cane	.. .. .	41.5	7	-4	4	11	1	3
Sucrose	.. .. .	14.8	-2	-3	-8	1	-6	-4
Sugar..	.. .. .	6.15	9	-9	12	9	1	7
24. Blue Castle—Chisholm No. 2								
Cane	.. .. .	49.8	25	19	2	-1	8	15
Sucrose	.. .. .	13.8	9	20	2	4	3	10
Sugar..	.. .. .	6.86	16	-1	18	-5	13	5
25. Blue Castle—Garrick								
Cane	.. .. .	46.0	6	-3	4	6	-7	9
Sucrose	.. .. .	14.8	-2	19	1	12	31	-9
Sugar..	.. .. .	6.82	8	-19	4	-3	-28	16
26. Blue Castle—Guthrie Pen No. 5								
Cane	.. .. .	47.2	3	-16	-23	10	-21	-16
Sucrose	.. .. .	13.5	4	-6	-2	10	-12	5
Sugar..	.. .. .	6.35	0.53	-12	-22	2	-12	-21

		Responses to extra N, P, K					
		Normal time of N application			Late time of N application		
	Control yield	N %	P %	K %	N %	P %	K %
27. Blue Castle—Guthrie Pen No. 15							
Cane	48.2	1	16	1	5	7	9
Sucrose	13.8	-7	4	7	10	5	5
Sugar.. .. .	6.64	7	16	-6	-5	2	4
28. Blue Castle—Pasture Piece							
Cane	54.9	-14	-9	14	1	-8	12
Sucrose	14.9	8	11	2	10	4	10
Sugar.. .. .	8.18	-20	-18	9	-22	-12	1
29. Blue Castle—School House No. 2							
Cane	52.1	1	4	0.41	-14	-1	-3
Sucrose	11.7	-11	5	24	8	26	0.45
Sugar.. .. .	6.12	11	-6	-18	-21	-22	-7
30. Blue Castle—Trench							
Cane	48.8	5	10	10	7	5	15
Sucrose	14.2	-3	-0.15	-3	-4	-0.44	-2
Sugar.. .. .	6.94	8	9	13	12	5	18
31. Cornwall—John Grass No. 4							
Cane	74.3	-21	4	20	-26	16	9
Sucrose	13.5	4	19	7	10	17	9
Sugar.. .. .	10.05	-2	-1	1	-3	0.26	0.33
32. Cornwall—Pasture Piece No. 2							
Cane	42.6	6	-3	9	9	4	1
Sucrose	15.6	11	12	-3	27	11	-2
Sugar.. .. .	6.63	0.35	-1	1	-1	-1	0.23
33. Cornwall—Risley No. 4							
Cane	57.4	-24	1	17	18	3	12
Sucrose	12.2	-14	5	4	-12	9	0.50
Sugar.. .. .	6.97	-1	-1	1	3	-1	1
34. Fontabelle—Chambers							
Cane	48.5	-2	-5	2	1	-9	6
Sucrose	13.8	5	-7	12	20	2	-2
Sugar.. .. .	6.69	-6	2	-9	-16	-10	3
35. Fontabelle—Morass No. 3							
Cane	46.1	9	5	16	-2	27	-3
Sucrose	12.9	16	-5	7	10	6	-3
Sugar	5.97	-6	11	9	-11	6	1
36. Fontabelle—Morass No. 19							
Cane	56.0	13	-12	-9	0.27	-9	-14
Sucrose	13.9	-3	14	-4	6	-10	22
Sugar.. .. .	7.78	16	-23	-4	4	1	-29
37. Friendship—Swamp No. 2							
Cane	57.4	-6	6	-9	-4	-5	1
Sucrose	14.7	19	28	-6	4	5	16
Sugar.. .. .	8.46	-2	-2	-1	-1	-1	-1
38. Friendship—Sylvester No. 2							
Cane	34.6	-2	-12	8	1	15	-18
Sucrose	14.5	-9	1	0.23	7	16	13
Sugar.. .. .	5.00	1	-1	1	1	-0.03	-1
39. Friendship—Sylvester No. 3							
Cane	46.8	1	7	-9	5	-5	1
Sucrose	13.2	-7	-1	1	-4	-6	7
Sugar.. .. .	6.18	1	1	-1	1	0.19	-1

				Responses to extra N, P, K						
				Normal time of N application			Late time of N application			
				Control yield	N %	P %	K %	N %	P %	K %
40. Friendship—Sylvester No. 4										
Cane	..	..	..	37.2	-5	45	-3	9	27	8
Sucrose	..	..	..	14.0	-4	-4	0.51	11	2	-5
Sugar..	..	..	..	5.19	-0.06	5	-0.46	-0.26	3	1
41. Friendship—Wilson										
Cane	..	..	..	43.8	11	5	6	0.23	8	4
Sucrose	..	..	..	13.6	5	-6	-2	2	-8	-0.28
Sugar..	..	..	..	5.97	1	1	1	-0.24	2	0.43
42. Frome—Causeway										
Cane	..	..	..	43.1	7	-4	8	27	0.07	3
Sucrose	..	..	..	12.2	-14	-5	4	-12	-9	0.25
Sugar..	..	..	..	5.27	23	-9	5	45	8	5
43. Frome—Grant										
Cane	..	..	..	59.7	-6	-8	-26	-19	-27	-9
Sucrose	..	..	..	12.9	-4	-9	-8	9	-19	6
Sugar..	..	..	..	6.68	7	10	-15	-19	-3	-5
44. Frome—Pearly										
Cane	..	..	..	75.5	-29	-0.22	-15	-20	-6	-8
Sucrose	..	..	..	12.1	-3	-0.18	1	4	11	-9
Sugar..	..	..	..	9.16	-26	-0.04	-16	-22	-15	-1
45. Frome—Richardson										
Cane	..	..	..	46.3	9	-14	3	12	-14	3
Sucrose	..	..	..	13.6	9	6	-6	11	1	7
Sugar..	..	..	..	6.29	1	-19	8	1	-8	-4
46. Masemure—Golden Bottom										
Cane	..	..	..	41.2	16	3	-1	12	1	-2
Sucrose	..	..	..	14.1	1	1	-1	2	1	-0.3
Sugar..	..	..	..	5.80	3	-2	-1	6	-4	1
47. Masemure—Village										
Cane	..	..	..	35.7	13	-6	18	10	4	5
Sucrose	..	..	..	13.7	1	1	2	1	1	1
Sugar..	..	..	..	4.88	1	-2	-1	4	-0.07	-3
48. Meylersfield—Big Pasture										
Cane	..	..	..	26.3	4	14	2	-7	8	9
Sucrose	..	..	..	14.6	2	-0.36	0.22	-2	2	-3
Sugar..	..	..	..	3.86	2	15	2	-5	5	12
49. Midgham—Major										
Cane	..	..	..	61.1	-1	-5	-1	8	-2	-9
Sucrose	..	..	..	10.8	-3	13	2	-3	14	0.26
Sugar..	..	..	..	6.59	0.16	-2	-0.27	-1	-1	-1
50. Midgham—Maria Bridge										
Cane	..	..	..	44.9	-8	21	12	3	16	16
Sucrose	..	..	..	14.7	-1	0.30	-3	1	-2	-0.44
Sugar..	..	..	..	6.61	-1	2	2	0.16	2	2
51. Midgham—Morass										
Cane	..	..	..	32.9	16	20	-2	6	12	6
Sucrose	..	..	..	13.3	-5	4	9	7	3	1
Sugar..	..	..	..	4.37	3	4	-2	-0.07	1	1
52. Mint—Amelia										
Cane	..	..	..	40.1	4	-9	15	11	2	3
Sucrose	..	..	..	8.8	-10	0.48	-10	-12	1	-9
Sugar..	..	..	..	3.53	2	-1	3	0.01	0.19	1
53. Mint—Guinea Corn										
Cane	..	..	..	32.6	13	4	8	9	2	10
Sucrose	..	..	..	9.2	-8	-9	-18	-15	-17	-11
Sugar..	..	..	..	3.00	2	1	3	3	2	2

			Responses to extra N, P, K					
			Normal time of N application			Late time of N application		
			N %	P %	K %	N %	P %	K %
54.	Mint—Mt. Eagle Line	Control yield						
	Cane	22.9	21	12	16	13	23	7
	Sucrose	13.8	-2	4	-6	3	2	-5
	Sugar.. .. .	3.15	2	1	2	1	1	1
55.	Mt. Eagle—Camp Sav. Village							
	Cane	40.8	2	-4	2	-8	5	3
	Sucrose	15.5	-14	22	35	-5	42	13
	Sugar.. .. .	6.31	-1	-2	-2	1	-7	1
56.	Mt. Eagle—Mitchell							
	Cane	39.1	-5	-6	1	-11	6	-8
	Sucrose	12.2	7	10	-4	-2	10	-3
	Sugar.. .. .	4.78	-1	-1	0.38	-1	-0.32	-1
57.	Paul Island—Belle Isle Piece							
	Cane	46.5	-6	-5	-6	-6	-9	-2
	Sucrose	15.1	2	7	-9	5	-1	-2
	Sugar.. .. .	7.01	-1	-1	0.34	-1	-1	0.02
58.	Paul Island—Rose Piece (Block near Pasture)							
	Cane	54.2	-11	9	-4	3	4	1
	Sucrose	9.0	-11	8	-18	-6	-13	1
	Sugar.. .. .	4.89	0.03	0.01	2	1	2	-0.21
59.	Paul Island—Rose Piece (Block with 10 Beds Disc.)							
	Cane	47.9	1	20	9	20	11	15
	Sucrose	9.8	7	-14	-3	13	6	-21
	Sugar.. .. .	4.69	-1	4	1	1	1	5
60.	Paul Island—Rose Piece (Block with Hut).							
	Cane	53.4	-6	-2	-1	-1	14	13
	Sucrose	9.0	-15	-15	-6	5	-19	1
	Sugar.. .. .	4.80	1	1	0.42	-1	1	1
61.	Paul Island—Soffray Common							
	Cane	45.6	-7	-7	13	-4	2	3
	Sucrose	13.6	4	-7	5	-4	-4	2
	Sugar.. .. .	6.20	-1	-0.04	1	0.01	1	0.14
62.	Retrieve—Banana Piece							
	Cane	22.8	1	88	6	8	85	5
	Sucrose	12.3	1	8	0.32	1	7	1
	Sugar.. .. .	2.81	-9	5	0.06	2	6	2
63.	Retrieve—Bene							
	Cane	40.1	-15	20	14	-6	27	7
	Sucrose	14.5	-2	2	2	-1	2	1
	Sugar.. .. .	5.82	2	1	-5	-1	2	-5
64.	Retrieve—Dago Hole							
	Cane	34.5	6	-2	-5	4	-4	-2
	Sucrose	14.8	0.31	-0.09	-0.41	-0.15	-1	0.36
	Sugar.. .. .	5.10	2	-1	-1	6	5	-6
65.	Retrieve—Hut Piece							
	Cane	42.1	-2	17	-5	14	2	8
	Sucrose	13.9	-11	3	-0.12	1	2	1
	Sugar.. .. .	5.85	-0.37	-11	-4	2	-13	-2
66.	Retrieve—Murray Piece							
	Cane	21.0	14	10	19	-3	12	21
	Sucrose	11.39	2	1	1	0.05	2	1
	Sugar.. .. .	2.39	-6	-3	5	-3	6	9
67.	Shrewsbury—Barracks							
	Cane	45.0	0.23	19	-7	-3	4	7
	Sucrose	14.8	22	13	-7	11	6	12
	Sugar.. .. .	6.66	2	0.60	0.06	-1	1	0.4
68.	Shrewsbury—Water Ground							
	Cane	42.9	7	2	6	-6	15	-6
	Sucrose	14.2	-1	8	10	3	6	11
	Sugar.. .. .	6.09	1	-1	-0.39	-1	1	2

PART 2

TRASH BURNING x NITROGEN EXPERIMENTS

1. Frome—Barham—Lookout (B4362)

	CANE			SUCROSE			SUGAR		
	N ₁	N ₂	Mean	N ₁	N ₂	Mean	N ₁	N ₂	Mean
Spring Plants									
B ₀	43.7	103	44.3	14.7	94	14.3	6.4	97	6.3
B ₁	91	109	99	100	101	103	92	113	103
B ₂	109	112	108	94	89	95	103	100	103
Mean	43.7	108	—	14.5	96	—	6.3	105	—
1st Ratoons									
B ₀	45.1	91	43.0	15.3	90	14.5	6.9	82	6.2
B ₁	107	100	108	104	90	101	111	90	110
B ₂	93	88	95	99	102	106	92	90	100
Mean	45.0	93	—	15.4	93	—	6.9	86	—

2. Frome—Belle Isle—Sydney (B41227)

	CANE			SUCROSE			SUGAR		
	N ₁	N ₂	Mean	N ₁	N ₂	Mean	N ₁	N ₂	Mean
Spring Plants									
B ₀	25.0	103	25.4	12.4	101	12.3	3.1	103	3.2
B ₁	124	124	122	103	98	100	126	123	122
B ₂	107	115	109	98	98	99	106	113	109
Mean	27.6	103	—	12.3	100	—	3.4	103	—
1st Ratoons									
B ₀	36.5	101	36.7	13.4	112	14.2	4.9	113	5.2
B ₁	106	101	103	110	103	100	117	104	104
B ₂	98	102	99	100	106	98	98	108	97
Mean	37.1	100	—	13.9	104	—	5.2	103	—

3. Frome—Masemure—Albany—Guava Walk (B4362)

	CANE			SUCROSE			SUGAR		
	N ₁	N ₂	Mean	N ₁	N ₂	Mean	N ₁	N ₂	Mean
Spring Plants									
B ₀	49.3	114	35.1	14.5	103	14.7	7.1	118	7.8
B ₁	99	103	95	99	100	97	99	103	90
B ₂	116	100	101	95	99	94	110	99	95
Mean	51.7	102	—	14.1	103	—	7.3	102	—
1st Ratoons									
B ₀	42.9	109	44.7	14.7	101	14.9	6.3	110	6.6
B ₁	85	66	87	101	96	98	86	93	85
B ₂	94	99	92	103	104	96	91	95	89
Mean	39.8	109	—	14.7	99	—	5.8	107	—

4. Frome—Mint—Mt. Eagle—Plum Tree (B41227)

	CANE			SUCROSE			SUGAR		
	N ₁	N ₂	Mean	N ₁	N ₂	Mean	N ₁	N ₂	Mean
Spring Plants									
B ₀	25.7	113	27.4	14.7	96	14.3	3.8	108	4.0
B ₁	112	109	104	101	90	103	113	108	105
B ₂	132	122	119	96	100	100	126	121	118
Mean	29.5	100	—	14.5	100	—	4.7	100	—
1st Ratoons									
B ₀	36.6	113	38.9	16.3	99	16.2	6.0	111	6.3
B ₁	110	108	103	100	95	102	100	104	88
B ₂	126	118	114	99	100	100	124	118	100
Mean	40.9	101	—	16.2	99	—	6.6	100	—

5. Frome—Shrewsbury—Pasture Piece (B41227)

				CANE			SUCROSE			SUGAR		
				N ₁	N ₂	Mean	N ₁	N ₂	Mean	N ₁	N ₂	Mean
Spring Plants												
B ₀	..	..	..	31.5	101	31.7	15.4	99	15.4	4.9	100	4.9
B ₁	..	..	..	163	123	142	99	94	97	161	114	139
B ₂	..	..	..	101	104	102	85	87	89	86	90	88
Mean	..	..	..	38.2	90	—	14.6	93	—	5.7	88	—
1st Ratoons												
B ₀	..	..	..	36.4	109	37.9	15.4	97	15.2	5.6	106	5.8
B ₁	..	..	..	124	122	117	87	73	80	108	88	95
B ₂	..	..	..	108	111	105	70	71	71	75	79	75
Mean	..	..	..	40.2	103	—	12.9	106	—	5.3	97	—
Summary:												
				CANE			SUCROSE			SUGAR		
				N ₁	N ₂	Mean	N ₁	N ₂	Mean	N ₁	N ₂	Mean
B ₀	..	..	..	35.1	107	36.3	14.3	99	14.2	5.1	106	5.2
B ₁	..	..	..	114	112	109	101	99	100	115	111	109
B ₂	..	..	..	112	109	107	94	94	95	106	102	101
Mean	..	..	..	38.1	100	—	14.0	99	—	5.4	100	—
S.E. % G.M.	..	..	..	12.2			0.23			13.8		
Sig. Diff.	..	..	..	—			3.2			—		
1st Ratoons												
B ₀	..	..	..	39.5	104	40.2	15.0	100	15.0	5.9	103	6.0
B ₁	..	..	..	106	105	103	100	90	95	106	95	99
B ₂	..	..	..	103	103	101	92	93	93	96	98	95
Mean	..	..	..	40.6	101	—	14.5	97	—	6.0	98	—
S.E. % G.M.	..	..	..	7.6			7.4			9.8		
Sig. Diff.	..	..	..	—			—			—		
				N.B. B ₀ = No Trash burnt.								
				B ₁ = Trash burnt only before replanting.								
				B ₂ = Trash burnt every year.								
				N ₁ = Normal S/A application 3 cwt. per acre 33 lb. 10 oz.								
				N ₂ = 50% extra S/A per acre 4½ „ 50 „ 6 „								

PART 3

RESULTS OF VARIETY EXPERIMENTS

A summary of the results of the variety experiments reaped in 1959 is presented below. Actual yields in tons cane per acre, % sucrose (or pol % cane*) and tons sugar per acre (or tons pol per acre*) obtained by the standard variety, are quoted, and the yields obtained from the other varieties are expressed as a percentage of the standard.

COMPARISON OF COMMERCIAL VARIETIES

HIGH RAINFALL AREAS

Variety	CANE				POL % CANE* OR SUCROSE				POL* OR SUGAR			
	P.	1st R.	2nd R.	3rd R.	P.	1st R.	2nd R.	3rd R.	P.	1st R.	2nd R.	3rd R.
1. Frome—Belle Isle—Meylersfield—Butchers Clump (spring planted 1955)												
B37161 ..	21.4	31.4	37.7	34.7	13.4	12.2	13.9	12.7	2.9	3.8	5.3	4.4
B41227 ..	125	128	120	107	106	109	99	102	133	140	123	108
B42231 ..	114	109	103	102	98	111	98	103	111	122	105	105
B4362 ..	130	117	109	109	100	117	94	110	131	137	115	120
S.E. % g.m.	4.4	13.1	7.4	4.8	5.1	3.0	8.8	6.3	8.6	12.3	10.0	7.5
Sig. Diff.	9.0	—	—	—	—	4.8	—	—	17.7	26.5	—	—
2. Frome—Shrewsbury—Shrewsbury—Top Cabbage (spring planted 1955)												
B37161 ..	30.5	34.3	29.3	34.3	13.9	12.8	13.1	13.8	4.2	4.4	3.8	4.7
B41227 ..	113	121	133	122	89	99	106	81	100	120	125	99
B42231 ..	89	104	106	87	105	103	99	90	93	108	107	78
B4362 ..	118	109	108	109	108	113	92	95	128	122	117	104
S.E. % g.m.	6.3	7.8	4.6	6.5	3.1	5.3	2.6	5.0	7.1	8.8	4.6	2.4
Sig. Diff.	11.5	14.6	2.6	11.8	5.4	—	0.4	9.5	13.0	—	0.3	10.0
3. Frome—Masemure—Retrieve—Jeyes (8 x 4 R. B. Variety trial) (spring plants)												
B41227 ..	44.6	51.2			13.8	14.6			6.2	7.5		
B4362 ..	105	73			99	103			106	74		
B49119 ..	102	102			106	86			97	91		
B49198 ..	101	87			145	83			72	73		
B49396 ..	85	93			99	101			86	95		
B5037 ..	87	90			93	98			93	88		
B52405 ..	86	83			93	101			92	83		
B52407 ..	89	69			103	94			86	65		
S.E. % g.m.	10.9	9.7			11.9	4.2			12.1	14.0		
Sig. Diff.	6.7	12.4			1.3	6.4			1.0	17.3		
4. Frome—Blackheath—Mingo (8 x 4 R. B. Variety trial) (spring plants)												
B41227 ..	35.6	43.5			12.7	13.9			4.6	6.1		
B4362 ..	82	79			91	103			90	83		
B49119 ..	103	108			113	97			93	105		
B49198 ..	98	86			131	84			78	72		
B49396 ..	93	94			100	107			93	100		
B5037 ..	98	86			93	104			105	89		
B52405 ..	102	99			101	84			104	84		
B52407 ..	112	103			159	73			70	77		
S.E. % g.m.	6.1	10.4			12.0	10.9			12.8	15.0		
Sig. Diff.	3.2	14.4			1.6	17.3			0.8	19.7		

LATTICE TRIALS—PLANTS

TABLE I

B64's AND FOREIGN VARIETIES

Varieties	CANE										SUCROSE % JUICE										SUGAR														
	North Coast						Wet East		Central	Irrigated		North Coast					Wet East		Central	Irrigated		North Coast					Wet East		Central	Irrigated					
	Light		Wet West				Light		Medium	Medium		Light		Wet West				Light		Medium	Light		Heavy	Light		Wet West				Light		Heavy			
	1	2	3	4	5	6*	7	8	9	1	2	3	4	5	6*	7	8	9	1	2	3	4	5	6*	7	8	9	1	2	3	4	5	6*	7	8	9
B37172	—	—	—	—	30-28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B41227	82	83	92	59-71	—	91	111	30-64	37-58	74	81	98	15-32	—	70	90	10-09	9-52	63	83	92	—	4-35	—	—	—	—	—	—	—	—	—	—	—	—
B4362	33-66	60-42	47-41	80	100	45-13	23-22	98	98	11-11	11-43	16-55	96	102	7-22	15-87	129	97	3-74	6-86	3-18	87	97	—	—	—	—	—	—	—	—	—	—	—	—
B5277	80	72	86	117	—	88	110	68	88	92	—	—	—	92	—	90	104	97	80	62	97	—	107	—	—	—	—	—	—	—	—	—	—	—	
B5387	83	83	86	86	148	—	97	88	88	92	100	119	84	100	—	97	104	106	84	91	117	71	149	—	—	—	—	—	—	—	—	—	—	—	
B53299	86	74	84	91	143	76	70	73	87	87	85	107	71	98	113	88	108	108	71	71	89	69	137	—	—	—	—	—	—	—	—	—	—	—	
B5401	74	—	80	93	71	73	72	92	76	90	62	108	93	101	98	89	115	100	88	—	84	90	77	—	—	—	—	—	—	—	—	—	—	—	
B5463	100	72	78	90	117	64	74	89	85	90	62	116	83	108	102	91	100	88	89	47	94	74	120	—	—	—	—	—	—	—	—	—	—	—	
B5480*	79	67	72	105	131	77	74	76	73	93	87	109	97	98	145	90	114	108	66	56	79	103	126	—	—	—	—	—	—	—	—	—	—	—	
B5490*	79	65	65	85	131	76	84	64	84	96	101	111	94	97	99	94	104	113	75	70	74	81	126	—	—	—	—	—	—	—	—	—	—	—	
B54142	—	—	—	—	104	103	67	—	92	—	—	—	—	100	89	119	—	111	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
B54162	81	84	69	104	106	45	—	70	71	82	84	104	111	—	86	—	97	101	90	67	70	81	—	110	99	—	—	—	—	—	—	—	—	—	
B54172	—	—	—	—	108	—	52	—	—	—	—	—	—	86	—	107	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
B51153*	82	65	73	98	89	96	97	111	109	75	66	135	60	80	88	77	90	94	82	41	98	58	64	—	—	—	—	—	—	—	—	—	—	—	
B54282	—	73	88	196	135	81	76	102	115	—	63	118	73	84	68	82	109	84	—	47	94	97	131	—	—	—	—	—	—	—	—	—	—	—	
B54291	87	—	88	101	—	92	81	90	102	81	—	103	94	—	100	89	112	87	70	—	83	74	—	—	—	—	—	—	—	—	—	—	—	—	
B54310	92	—	—	—	176	—	—	106	79	80	—	—	—	61	—	86	96	—	84	—	65	99	—	—	—	—	—	—	—	—	—	—	—	—	
B54315	79	—	82	107	—	74	76	—	79	80	—	114	89	—	86	96	—	87	—	64	—	65	99	—	—	—	—	—	—	—	—	—	—	—	
B5425	—	70	79	98	—	90	81	—	89	—	90	109	60	—	100	98	—	96	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
B5428	99	70	88	101	191	85	93	106	86	66	71	128	81	84	95	78	78	95	50	50	107	80	99	—	—	—	—	—	—	—	—	—	—	—	
B5429	—	75	88	103	157	91	89	102	86	—	73	154	87	83	80	88	113	108	—	59	80	91	124	—	—	—	—	—	—	—	—	—	—	—	
B5446	—	70	72	91	136	82	74	98	69	—	63	105	85	80	100	89	80	87	—	69	78	79	111	—	—	—	—	—	—	—	—	—	—	—	
CP54179	82	70	—	—	—	—	—	—	—	81	109	—	—	—	—	—	—	—	88	77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
CP54120	104	—	—	—	—	84	73	—	63	76	—	—	—	—	153	89	—	88	79	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
CP54108	84	62	—	96	140	95	—	78	—	84	78	—	78	100	88	—	97	—	72	60	77	137	—	—	—	—	—	—	—	—	—	—	—	—	
CP56111	66	70	89	95	131	98	90	89	88	76	89	146	66	80	97	83	61	86	65	35	113	65	105	—	—	—	—	—	—	—	—	—	—	—	
CP44101	—	74	76	95	—	—	—	—	—	—	111	96	—	—	—	—	—	—	—	81	70	—	—	—	—	—	—	—	—	—	—	—	—	—	
CP44154	78	61	64	64	—	110	91	68	89	66	77	89	—	—	—	—	—	—	—	61	70	—	—	—	—	—	—	—	—	—	—	—	—	—	
Co331	90	—	—	—	—	—	—	—	—	73	—	—	—	79	122	89	95	61	59	36	79	77	89	—	—	—	—	—	—	—	—	—	—	—	
F31/436	—	59	—	—	—	—	—	—	—	60	—	—	—	—	—	—	—	—	71	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
F37	88	85	85	101	121	97	92	107	87	80	106	120	68	82	96	87	100	82	63	52	74	56	109	—	—	—	—	—	—	—	—	—	—	—	—
*50	77	68	76	80	125	54	70	87	85	85	77	110	72	90	75	91	105	96	78	100	92	69	113	—	—	—	—	—	—	—	—	—	—	—	—
*56	62	68	70	79	83	26	74	48	88	85	75	144	53	102	26	85	88	—	54	42	91	43	87	—	—	—	—	—	—	—	—	—	—	—	
*57	70	85	70	76	129	71	65	80	74	65	102	107	95	95	114	93	125	85	49	70	72	73	124	—	—	—	—	—	—	—	—	—	—	—	
S.E. ° C.M.	13-9	11-5	8-3	17-0	18-4	18-3	7-4	16-3	12-9	7-8	15-4	—	13-1	9-4	26-8	5-5	12-1	9-3	17-0	20-5	—	20-9	11-0	—	—	—	—	—	—	—	—	—	—	—	—
Sig. diff. at 5%	19-8	13-8	11-3	—	36-1	24-5	10-2	24-8	18-1	10-9	22-7	—	18-3	14-4	43-9	8-5	20-4	14-6	20-0	21-7	—	28-7	—	—	—	—	—	—	—	—	—	—	—	—	—

1. HAMPDEN—Heshouse 2.

3. FROME—Belle Isle—Graham.

5. SERGE ISLAND—Corn 2.

7. WORTHY PARK—Middle Piece 5.

8. BERNARD LODGE 2C.

2. BARNETT—Road Piece 4.

4. HOLLAND—Railings 2.

6. RICHMOND/LLANDOVERY—Brady Piece.

9. MONYMUSK—Exeter 01.

* 1st ratoons.

B52 AND B52400's (4TH 500)

LATTICE TRIALS—1ST RATOONS

TABLE III

BJ54's

	CANE					SUCROSE % JUICE					SUGAR				
	North Coast		Central			North Coast		Central			North Coast		Central		
	Light	Medium	Irrigated		Heavy	Light	Medium	Irrigated		Heavy	Light	Medium	Irrigated		Heavy
			Light					Light					Light		
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Standard ..	B41227	B4362	B42231	B4362	B41227	B41227	B4362	B42231	B4362	B41227	B41227	B4362	B42231	B4362	B41227
B41227 ..	42-77	87	—	—	56-45	11-85	110	—	—	9-06	97	—	—	—	5-12
B42231 ..	—	—	35-50	—	—	—	—	11-62	—	—	—	—	4-06	—	—
B4362 ..	—	55-21	63	48-83	97	—	14-97	110	10-42	113	—	8-21	71	5-06	109
B52107 ..	—	—	—	133	—	—	—	—	97	—	—	—	—	133	—
B52158 ..	—	—	—	113	—	—	—	—	97	—	—	—	—	111	—
B52182 ..	—	—	—	99	—	—	—	—	98	—	—	—	—	97	—
B52256 ..	—	—	—	84	—	—	—	—	84	—	—	—	—	73	—
B52313 ..	—	—	—	149	—	—	—	—	98	—	—	—	—	147	—
B52389 ..	—	—	—	140	—	—	—	—	86	—	—	—	—	121	—
4/247 ..	—	—	52	—	—	—	—	99	—	—	—	—	52	—	—
B52448 ..	77	—	—	—	—	103	—	—	—	—	80	—	—	—	—
B5401 ..	70	63	54	—	—	106	91	88	—	—	77	54	48	—	—
B5402 ..	68	90	101	102	—	98	91	85	74	—	66	82	87	76	—
B5403 ..	72	66	—	117	88	85	85	—	85	89	62	56	—	100	78
B5404 ..	73	77	51	—	88	90	95	95	—	113	66	74	50	—	100
B5405 ..	88	67	95	—	95	111	104	96	—	135	97	69	98	—	131
B5407 ..	76	77	35	103	75	108	102	86	91	117	87	78	31	94	88
B5408 ..	51	58	64	95	79	106	102	101	117	110	51	53	65	111	87
B5409 ..	79	—	105	113	92	108	—	103	103	119	86	—	109	125	109
B5412 ..	94	73	117	140	141	96	98	101	106	120	89	73	113	149	168
B5414 ..	99	99	88	—	—	93	98	102	—	—	95	98	94	—	—
B5416 ..	81	69	67	—	—	93	94	88	—	—	76	65	53	—	—
B5417 ..	—	96	126	—	—	—	102	113	—	—	—	98	144	—	—
B5418 ..	75	72	51	—	—	103	100	92	—	—	78	73	48	—	—
B5419 ..	101	—	—	—	92	95	—	—	—	115	99	—	—	—	106
B5420 ..	91	88	89	118	70	87	81	70	93	113	89	71	65	110	78
B5421 ..	85	77	—	86	82	97	91	—	100	102	81	71	—	64	84
B5422 ..	79	80	—	103	90	108	107	—	101	122	86	91	—	103	113
B5423 ..	91	78	86	104	86	105	97	101	98	115	97	76	90	103	100
B5424 ..	82	—	130	117	94	104	—	94	103	105	86	—	122	120	97
B5425 ..	—	78	—	—	—	—	105	—	—	—	—	82	—	—	—
B5426 ..	—	—	68	122	—	—	—	87	102	—	—	—	60	125	—
B5428 ..	—	85	—	—	—	—	84	—	—	—	—	72	—	—	—
B5429 ..	—	85	—	—	—	—	99	—	—	—	—	86	—	—	—
B5430 ..	88	76	71	112	93	99	84	93	109	88	75	61	103	—	103
B5431 ..	96	81	100	129	113	100	98	93	104	123	96	79	95	134	141
B5434 ..	—	—	44	69	—	—	—	91	103	—	—	—	40	69	—
B5435 ..	—	—	56	99	—	—	—	95	116	—	—	—	55	116	—
B5436 ..	67	63	72	122	99	96	101	85	87	107	67	63	61	106	109
B5437 ..	86	89	75	—	93	78	93	91	—	—	69	84	72	—	—
B5438 ..	86	78	68	—	93	110	100	97	—	118	93	77	67	—	110
B5439 ..	79	70	73	—	71	102	97	92	—	92	81	66	64	—	64
B5440 ..	80	69	111	—	82	86	74	86	—	—	58	58	84	—	—
B5441 ..	82	74	84	—	110	82	100	98	—	102	66	76	86	—	110
B5443 ..	101	66	90	119	88	94	105	110	127	112	95	71	102	153	100
B5443 ..	90	79	91	113	84	102	104	90	117	113	94	83	84	133	96
B5444 ..	83	71	43	75	81	101	104	98	85	135	82	74	43	64	107
B5445 ..	82	73	82	119	88	104	89	94	92	103	88	64	77	109	90
B5446 ..	—	74	—	—	—	—	104	—	—	—	—	77	—	—	—
B5447 ..	78	—	96	121	—	80	—	93	92	—	62	—	81	112	—
B5448 ..	83	89	99	134	104	98	97	97	78	114	81	86	97	105	118
B5449 ..	76	60	51	—	87	111	102	97	—	132	83	62	51	—	115
B5450 ..	99	78	85	—	108	96	96	97	—	110	97	76	85	—	119
B5451 ..	79	68	44	—	100	104	111	105	—	130	84	76	47	—	131
B5452 ..	79	—	50	—	84	115	—	81	—	115	87	—	42	—	101
B5453 ..	86	—	105	—	—	98	—	96	—	—	87	—	101	—	—
B5454 ..	—	—	—	130	—	—	—	—	71	—	—	—	—	81	—
B5455 ..	64	75	46	111	85	110	102	93	112	105	71	77	43	124	88
B5456 ..	—	83	68	127	—	—	94	98	93	—	77	68	119	—	—
B5457 ..	79	71	—	—	110	87	101	—	—	101	67	72	—	—	112
B5458 ..	—	48	—	—	—	—	88	—	—	—	42	—	—	—	—
B5459 ..	—	64	85	—	—	—	101	102	—	—	—	66	89	—	—
B5480 ..	—	77	114	—	—	—	102	95	—	—	—	79	111	—	—
B5481 ..	78	86	90	—	88	114	104	86	—	117	88	91	79	—	103
B5482 ..	58	77	98	130	111	101	102	104	108	120	59	79	106	141	131
B5483 ..	—	94	99	132	96	106	103	100	97	85	87	96	102	130	87
B5485 ..	77	61	97	80	91	97	90	97	105	108	75	54	95	76	97
B5486 ..	—	69	—	—	—	—	99	—	—	—	—	69	—	—	—
B5470 ..	—	—	62	—	—	—	—	111	—	—	—	—	74	—	—
Co331 ..	93	—	—	—	—	107	—	—	—	—	101	—	—	—	—
D62/43 ..	84	—	—	—	—	96	—	—	—	—	80	—	—	—	—
Pepe Cuca ..	77	—	—	—	—	119	—	—	—	—	91	—	—	—	—
PR902 ..	68	—	—	—	—	102	—	—	—	—	67	—	—	—	—
S.E. % g.m. ..	12-9	8-2	21-6	19-4	20-9	6-8	4-4	6-8	10-6	14-2	14-8	8-5	23-1	20-8	25-4
Sig. diff. at 5% ..	14-8	8-7	23-8	35-6	31-5	9-5	5-2	9-0	16-9	25-9	16-9	8-9	24-6	37-1	43-4

1. ORANGE VALLEY—Hot House.

4. CASWELL HILL—Section 19.

2. WORTHY PARK—Fig Tree 2.

5. INNSWOOD—Savannah 6.

3. BERNARD LODGE—Congrieve Park 15

FINAL TRIALS—1ST RATOONS

TABLE V

B49's, B50's AND B52400's

	CANE														
	North Coast					Wet West					Wet East				
	Medium					Heavy					Medium				
	Light	1	2	3	4	5	6	7	8	Light	9	10	11	12	Light
Standard	B41227	B41227	B37161	B41227	B41227	B41227	B37161	B41227	B41227	B37172	B37172	B37172	B37172	B41227	B41227
B37161	—	—	—	—	—	—	26-69	—	—	—	—	—	—	—	—
B37172	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B41227	39-13	26-61	—	—	—	—	—	—	—	—	—	—	—	—	—
B42231	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B4362	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B49119	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B49198	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B49363	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B49396	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B5037	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B5041	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B50347	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/235	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B52405	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/433	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B52407	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/443	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B52408	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/450	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B52409	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/52	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/370	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Co331	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Co421	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
H37/1933	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
May336	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NC2310	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pr1000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
S.E. % g.m.	12-9	19-0	16-8	10-8	10-8	11-8	15-8	9-7	10-4	20-9	18-5	9-7	14-3	14-3	12-9
Sig. diff. at 5%	16-3	24-4	41-3	17-3	17-3	16-8	28-5	12-4	14-4	24-9	29-6	15-7	17-3	18-7	19-0

1. ORANGE VALLEY—Starapple 1.
2. TRELAUNY ESTATES—Long Pond—Venture 2.
3. TRELAUNY ESTATES—Pond Piece.
4. ARCADIA—Top Lazy Ground.
5. APPLETON—Big Run 4.
6. BARNETT—Bogue 1.
7. FROME—Masemure—Jeyes.
8. FROME—Blackheath—Mingo.
9. SERGE ISLAND—April Piece.
10. GRAYS INN CENTRAL—Gibraltar—Lady Hole.
11. JAMAICA SUGAR ESTATES—Plantain Garden River—Vat 4.
12. RICHMOND/LLANDOVERY—Barracks 2.
13. BERNARD LODGE—Half Way Tree 10.
14. CAYMANAS—North Cumberland Pen 4E.
15. MONYMUSK—Hillside—Great House.
16. MONYMUSK—Plough Ground.
17. MONYMUSK—Salt Savannah—Still House.
18. INNSWOOD—Gladstone 23.
19. SEVENS—Parnassus 58.
20. UNITED ESTATES—Windsor Park 6.

TABLE V—continued

[illegible]

1. ORANGE VALLEY—Strapple 1.
2. TRELAWNY ESTATES—Long Pond—Venture 2.
3. TRELAWNY ESTATES—Pond Piece.
4. ARCADIA—Top Lazy Ground.
5. APPLETON—Big Run 4.
6. BARNETT—Bogue 1.
7. FROME—Masenure—Jeyes.
8. FROME—Blackheath—Wingo.
9. SERGE ISLAND—April Piece.
10. GRAYS INN CENTRAL—Gibraltar—Lady Hole.
11. JAMAICA SUGAR ESTATES—Plantain Garden River—Vat 4.
12. Richmond/Llandoverly—Barracks 2.
13. BERNARD LODGE—Half Way Tree 10.
14. CAYMANAS—North Cumberland Pen 4E.
15. MONYMUSK—Hillside—Great House.
16. MONYMUSK—Plough Ground.
17. MONYMUSK—Salt Savannah—Still House.
18. INNSWOOD—Gladstone 23.
19. SEVENS—Parnassus 58.
20. UNITED ESTATES—Windsor Park 6.

B51's AND B51400's (3RD 500)

S.F. % z.m.

TRELAWNV ESTATES LTD., Swanswick—McLaughlin.

FROMF.—Belle Isle Dixon Piece.

3. FROME.--Paul Island Belle Isle Piece.

4. WORTHY PARK—Three Acre.

5. CAYMANAS—Tulloch Pen 23A.

8. MONYMUSK—Hillside Coconut Tree.

7. MONY MOSK—YOSKYNOW

8. SEVENS—JOHNSON 3.

PART 4

CULTIVATION EXPERIMENTS

(1) LAND PREPARATION

1. Frome—Belle Isle—Meylersfield—Parkinson (B41227)

	CANE				SUCROSE				SUGAR			
	H	R	K	Mean	H	R	K	Mean	H	R	K	Mean
Spring Plants												
O	54.7	95	91	52.0	12.8	103	97	12.8	7.1	97	88	6.7
XR	100	93	88	98	96	94	96	96	97	88	85	94
XK	102	99	95	104	101	96	99	99	103	95	94	102
Mean	55.1	95	91	—	12.7	99	99	—	7.0	94	89	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m. ..	10.3	6.1	7.8		6.7	6.4	5.0		10.9	6.7	7.8	
Sig. Diff. ..	—	—	—		—	—	—		—	—	—	
1st Ratoons												
O	39.8	101	95	39.3	18.2	95	97	13.3	5.4	96	93	7.0
XR	105	103	92	101	101	98	103	103	106	101	94	104
XK	116	110	98	110	100	97	99	101	117	107	97	111
Mean	42.6	98	89	—	13.7	96	99	—	7.8	94	98	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m. ..	3.1	9.3	6.9		3.3	4.7	5.7		6.0	10.2	10.3	
Sig. Diff. ..	—	—	—		—	—	—		—	—	—	
2nd Ratoons												
O	48.6	99	108	49.7	15.3	100	100	15.3	7.5	101	93	7.6
XR	110	102	108	105	102	99	99	100	90	98	93	105
XK	104	100	109	102	99	101	101	100	97	99	93	102
Mean	50.9	96	103	—	15.3	100	99	—	7.8	96	102	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m. ..	12.3	9.6	7.3		5.7	3.8	6.7		13.1	8.1	10.6	
Sig. Diff. ..	—	—	—		—	—	—		—	—	—	

H = Harrowing. O = No Crossing. S = Straight Cultivation. R = Ripping.
 XR = Cross ripping. P = Cross cultivation. K = Knifing. XK = Cross knifing.

2. Frome—Belle Isle—Paul Island—Top Morass (B4362)

	CANE				SUCROSE				SUGAR			
	H	R	K	Mean	H	R	K	Mean	H	R	K	Mean
Spring Plants												
O	43.7	102	107	45.1	9.8	102	108	10.1	4.3	103	114	4.6
XR	97	108	101	99	107	98	107	101	103	105	108	99
XK	103	110	106	103	99	95	102	96	102	105	108	99
Mean	43.7	107	105	—	10.0	96	104	—	4.4	103	108	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m. ..	5.2	2.4	1.9		4.1	6.2	9.7		11.0	8.1	11.1	
Sig. Diff. ..	—	—	—		4.8	—	—		—	—	—	
1st Ratoons												
O	41.4	108	109	54.7	13.2	100	99	13.2	6.9	107	107	7.3
XR	103	111	105	101	96	93	91	94	99	103	96	95
XK	104	102	108	99	98	98	101	99	102	99	109	98
Mean	53.0	104	105	—	13.0	99	99	—	6.9	103	104	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m. ..	6.0	5.5	5.6		7.3	6.5	7.1		5.9	9.7	9.5	
Sig. Diff. ..	—	—	—		—	—	—		—	—	—	
2nd Ratoons												
O	41.0	114	108	43.8	13.7	98	95	13.3	5.6	110	103	5.8
XR	106	111	105	101	99	90	97	97	105	99	102	98
XK	109	111	106	102	99	98	99	101	108	103	104	103
Mean	43.2	106	101	—	13.6	96	98	—	5.9	99	100	—
	S	P	SP		S	P	SP		S	P	SP	
S.E. % g.m. ..	10.0	7.8	8.2		6.9	5.6	3.8		11.4	6.3	9.9	

	CANE				SUCROSE				SUGAR			
	H	R	K	Mean	H	R	K	Mean	H	R	K	Mean
3rd Ratoons												
O ..	46.7	102	107	48.2	12.6	96	95	12.2	5.9	98	102	5.9
XR ..	105	102	106	101	91	97	88	95	95	99	95	96
XK ..	102	94	109	98	91	107	94	100	93	100	99	98
Mean ..	47.9	97	105	—	8.5	106	98	—	5.7	103	103	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m.	15.3	8.5	5.1		12.5	9.4	8.7		11.1	10.4	8.3	
Sig. Diff. ..	—	—	—		—	—	—		—	—	—	

H = Harrowing. O = No crossing. S = Straight cultivation. R = Ripping.
 XR = Cross ripping. P = Cross cultivation. K = Knifing. XK = Cross knifing.

3. Frome—Masemure—Masemure—Belle Piece (B41227)

	CANE				SUCROSE				SUGAR			
	H	R	K	Mean	H	R	K	Mean	H	R	K	Mean
Spring Plants												
O ..	40.0	99	99	38.5	11.9	102	103	12.1	4.8	91	102	4.7
XR ..	94	93	100	99	103	92	98	96	96	85	97	95
XK ..	98	95	100	101	92	93	105	105	91	89	103	97
Mean ..	38.8	95	102	—	11.7	98	104	—	4.6	92	105	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m.	10.7	4.8	7.3		7.7	12.9	10.8		14.0	11.8	13.9	
Sig. Diff. ..	—	—	—		—	—	—		—	—	—	
1st Ratoons												
O ..	51.4	87	97	48.7	12.6	98	98	3.5	6.5	85	95	6.1
XR ..	94	91	102	101	93	98	97	4.1	87	89	98	98
XK ..	101	96	95	103	99	99	98	4.9	100	95	93	103
Mean ..	50.7	93	99	—	12.2	101	101	—	6.2	94	100	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m.	6.8	17.6	7.9		3.5	4.1	4.9		6.1	15.9	10.0	
Sig. Diff. ..	—	—	—		—	—	—		—	—	—	
2nd Ratoons												
O ..	39.6	91	102	38.7	12.0	102	97	11.9	4.7	93	100	4.7
XR ..	94	105	111	106	100	99	95	98	98	94	104	104
XK ..	102	108	109	109	99	97	97	97	97	102	106	107
Mean ..	39.1	103	109	—	11.9	100	97	—	4.7	102	105	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m.	6.8	17.6	7.9		3.9	8.0	6.0		18.3	9.4	11.9	
Sig. Diff. ..	—	—	—		—	—	—		—	—	—	
3rd Ratoons												
O ..	50.5	85	100	48.1	9.9	101	101	9.9	5.1	86	99	4.8
XR ..	91	89	108	101	102	99	99	99	91	86	106	100
XK ..	87	88	94	94	101	97	104	100	86	85	100	95
Mean ..	46.8	94	109	—	9.9	98	100	—	4.7	92	100	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m.	14.6	8.8	6.3		14.4	10.6	11.9		15.9	11.7	11.6	
Sig. Diff. ..	—	—	—		—	—	—		—	—	—	

H = Harrowing. O = No crossing. S = Straight cultivation. R = Ripping.
 XR = Cross ripping. P = Cross cultivation. K = Knifing. XK = Cross knifing.

4. Frome—Frome—Fontabelle—Morass 12 (B4362)

	CANE				SUCROSE				SUGAR			
	H	R	K	Mean	H	R	K	Mean	H	R	K	Mean
Spring Plants												
O ..	40.8	104	104	41.8	12.4	98	97	12.2	5.1	101	101	5.1
XR ..	109	117	113	110	97	100	91	98	106	118	107	109
XK ..	105	118	109	108	96	97	100	99	101	115	109	107
Mean ..	42.7	108	104	—	12.1	100	98	—	5.2	108	103	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m.	6.6	9.0	5.7		7.0	9.6	11.1		9.6	15.3	12.8	
Sig. Diff. ..	—	—	—		—	—	—		—	—	—	

	CANE				SUCROSE				SUGAR			
	H	R	K	Mean	H	R	K	Mean	H	R	K	Mean
1st Ratoons												
O	34.7	116	98	36.4	13.0	95	94	12.5	4.5	110	93	4.5
XR	105	113	109	104	96	96	101	101	101	108	110	105
XK	109	112	108	105	94	103	96	101	104	116	104	107
Mean	36.4	109	100	—	12.5	101	100	—	4.6	110	101	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m. ..	10.2	8.7	4.7		7.6	6.3	5.5		10.2	6.5	7.4	
Sig. Diff. ..	—	—	—		—	—	—		—	—	—	
2nd Ratoons												
O	37.0	100	88	35.5	10.9	99	96	9.3	4.1	96	83	3.8
XR	97	110	93	104	99	92	100	99	95	100	92	103
XK	102	100	95	103	98	99	100	101	99	98	94	104
Mean	36.8	103	93	—	9.2	98	99	—	4.0	100	91	—
	S.	P.	S.P.		S.	P.	S.P.		S.	P.	S.P.	
S.E. % g.m. ..	14.0	12.3	11.0		8.0	7.1	10.5		16.0	15.1	18.2	
Sig. Diff. ..	—	—	—		—	—	—		—	—	—	

H = Harrowing. O = No crossing. S = Straight cultivation. R = Ripping.
 XR = Cross ripping. P = Cross cultivation. K = Knifing. XK = Cross knifing.

(II) DRAW BED EFFECT

5. Frome—Belle Isle—Belle Isle—Morass (B4362)

	DISTANCE FROM INTERVAL IN CHAINS				S.E. % g.m.	Sig. Diff.
	1	2	3	4		
Spring Plants						
Cane	44.7	88	85	89	2.2	6.4
1st Ratoons						
Cane	35.0	99	92	104	5.7	—
Sucrose	14.4	103	102	95	3.2	—
Sugar	5.1	99	92	100	7.1	—
2nd Ratoons						
Cane	33.5	94	97	103	4.2	—
Sucrose	11.8	112	107	107	4.1	—
Sugar	3.9	103	100	108	8.0	—

6. Frome—Belle Isle—Meylersfield—Parkinson (B41227)

					S.E. % g.m.	Sig. Diff.
	1	2	3	4		
Spring Plants						
Cane	53.0	94	91	88	7.7	—
1st Ratoons						
Cane	46.3	103	95	106	5.6	—
Sucrose	13.8	97	101	102	0.8	2.5
Sugar	6.4	100	95	107	6.2	—
2nd Ratoons						
Cane	45.8	106	91	104	8.2	—
Sucrose	15.5	106	102	104	3.7	—
Sugar	6.7	120	100	114	3.7	—

7. Frome—Belle Isle—Paul Island—Allman Piece (B41227)

					S.E. % g.m.	Sig. Diff.
	1	2	3	4		
Spring Plants						
Cane	51.3	95	92	86	1.6	4.8
1st Ratoons						
Cane	49.9	101	92	89	4.6	—
Sucrose	13.7	99	95	96	2.0	—
Sugar	6.9	98	84	83	5.9	—
2nd Ratoons						
Cane	42.1	103	94	92	5.2	—
Sucrose	12.5	105	109	102	9.3	—
Sugar	5.3	109	103	92	12.9	—

8. Frome—Frome—Barham—Middle Ground (B4362)

				DISTANCE FROM INTERVAL IN CHAINS				S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	49.1	92	92	83	7.0	12.0
1st Ratoons									
Cane	..	..	..	43.1	99	95	93	5.7	—
Sucrose	..	..	..	13.6	101	99	101	3.8	—
Sugar	..	..	..	5.9	99	94	93	2.8	—
2nd Ratoons									
Cane	..	..	..	41.8	93	96	94	2.9	—
Sucrose	..	..	..	11.4	106	109	110	2.4	—
Sugar	..	..	..	4.6	103	108	107	10.1	—

9. Frome—Frome—Blue Castle—Guthrie Pen No. 2 (B41227)

				1	2	3	4	S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	51.4	110	97	77	4.5	13.7
1st Ratoons									
Cane	..	..	..	33.4	127	127	125	4.7	18.0
Sucrose	..	..	..	12.2	94	106	100	0.4	—
Sugar	..	..	..	4.1	83	74	79	5.7	21.8
2nd Ratoons									
Cane	..	..	..	37.3	102	105	106	6.4	—
Sucrose	..	..	..	11.1	105	111	115	8.3	—
Sugar	..	..	..	4.2	101	103	107	14.1	—

10. Frome—Frome—Fontabelle—Morass 20 (B4362)

				1	2	3	4	S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	49.7	99	95	95	4.0	—
1st Ratoons									
Cane	..	..	..	44.9	101	94	107	2.7	—
Sucrose	..	..	..	12.3	99	104	105	7.0	—
Sugar	..	..	..	5.3	96	97	85	6.1	—
2nd Ratoons									
Cane	..	..	..	39.1	92	95	96	3.4	—
Sucrose	..	..	..	10.9	106	99	113	8.4	—
Sugar	..	..	..	4.2	99	95	112	7.6	—

11. Frome—Frome—Frome—Cupid (B4362)

				1	2	3	4	S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	51.5	97	97	93	9.3	—
1st Ratoons									
Cane	..	..	..	37.5	98	108	95	8.2	—
Sucrose	..	..	..	15.4	98	102	97	2.1	—
Sugar	..	..	..	5.8	104	91	107	4.2	—
2nd Ratoons									
Cane	..	..	..	36.4	96	101	85	5.5	—
Sucrose	..	..	..	12.9	108	102	102	4.8	—
Sugar	..	..	..	4.5	111	110	103	13.1	—

12. Frome—Masemure—Albany—Curing House (B4362)

				1	2	3	4	S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	50.1	88	89	91	2.4	7.0
1st Ratoons									
Cane	..	..	..	42.7	95	93	98	7.4	—
Sucrose	..	..	..	14.5	100	95	96	4.7	—
Sugar	..	..	..	6.2	95	84	94	4.7	—
2nd Ratoons									
Cane	..	..	..	32.7	103	117	123	2.7	6.8
Sucrose	..	..	..	13.8	105	99	102	1.4	—
Sugar	..	..	..	4.3	107	117	125	5.5	—

13. Frome—Masemure—Masemure—Big Hill (B41227)

				DISTANCE FROM INTERVAL IN CHAINS				S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	42.0	98	93	98	6.4	—
1st Ratoon									
Cane	..	..	..	43.6	113	107	105	4.1	—
Sucrose	..	..	..	11.2	105	109	113	10.3	—
Sugar	..	..	..	5.1	114	109	117	13.3	—
2nd Ratoons									
Cane	..	..	..	40.0	101	102	108	4.9	—
Sucrose	..	..	..	9.3	105	105	100	7.2	—
Sugar	..	..	..	3.8	96	85	101	11.5	—

14. Frome—Masemure—Midgham—Three Corner (B41227)

				1	2	3	4	S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	46.0	81	76	87	6.3	—
1st Ratoons									
Cane	..	..	..	29.9	81	75	84	3.6	2.9
Sucrose	..	..	..	14.3	98	103	89	9.8	—
Sugar	..	..	..	4.4	77	76	74	0.2	0.5
2nd Ratoons									
Cane	..	..	..	38.8	77	69	88	2.8	7.1
Sucrose	..	..	..	12.6	109	111	111	4.5	—
Sugar	..	..	..	4.8	91	82	104	19.8	—

15. Frome—Mint—Mint—Jameson (B41227)

				1	2	3	4	S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	44.4	82	78	83	8.3	—
1st Ratoon									
Cane	..	..	..	35.6	89	88	87	5.5	—
Sucrose	..	..	..	12.3	108	112	110	4.4	—
Sugar	..	..	..	4.4	93	97	93	7.1	—
2nd Ratoons									
Cane	..	..	..	34.9	87	84	85	9.8	—
Sucrose	..	..	..	11.6	112	109	112	3.0	—
Sugar	..	..	..	4.2	107	90	94	16.0	—

16. Frome—Mint—Mt. Eagle—Ricketts (B41227)

				1	2	3	4	S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	51.7	107	108	107	5.3	—
1st Ratoons									
Cane	..	..	..	41.0	101	98	99	4.0	—
Sucrose	..	..	..	14.1	93	90	87	4.7	—
Sugar	..	..	..	5.9	95	90	82	6.1	—
2nd Ratoons									
Cane	..	..	..	39.7	109	109	103	5.3	—
Sucrose	..	..	..	13.7	99	95	92	2.4	—
Sugar	..	..	..	5.6	106	101	102	3.2	—

17. Frome—Shrewsbury—Cornwall—John Grass (B4362)

				1	2	3	4	S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	36.1	95	89	86	2.5	7.5
1st Ratoons									
Cane	..	..	..	31.4	110	93	97	12.2	—
Sucrose	..	..	..	14.3	105	109	107	0.8	2.6
Sugar	..	..	..	4.5	115	101	103	11.7	38.8
2nd Ratoons									
Cane	..	..	..	43.0	97	87	84	4.2	—
Sucrose	..	..	..	13.6	97	91	95	9.8	—
Sugar	..	..	..	6.0	96	84	82	8.5	—

18. Frome—Shrewsbury—Friendship—Browne (B41227)

DISTANCE FROM INTERVAL IN CHAINS								S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	42.3	93	83	100	3.3	9.9
1st Ratoons									
Cane	..	..	..	37.1	86	77	94	3.5	9.5
Sucrose	..	..	..	13.8	100	100	98	1.4	—
Sugar	..	..	..	5.1	86	77	92	4.6	13.2
2nd Ratoons									
Cane	..	..	..	35.4	92	85	94	3.9	—
Sucrose	..	..	..	13.6	110	109	105	3.3	—
Sugar	..	..	..	5.2	93	85	97	8.1	—

19. Frome—Shrewsbury—Shrewsbury—Roaring River (B4362)

								S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	40.0	99	101	91	5.4	—
1st Ratoons									
Cane	..	..	..	36.2	94	97	91	1.0	—
Sucrose	..	..	..	13.7	104	97	102	5.6	—
Sugar	..	..	..	4.9	101	93	92	5.5	—
2nd Ratoons									
Cane	..	..	..	31.9	103	103	100	4.4	—
Sucrose	..	..	..	12.9	83	91	92	8.8	—
Sugar	..	..	..	4.1	91	97	92	8.2	—

20. Frome—Shrewsbury—Shrewsbury—Top Marlie (B41227)

								S.E. % g.m.	Sig. Diff.
				1	2	3	4		
Spring Plants									
Cane	..	..	..	43.7	100	100	90	13.4	—
Summary:									
Cane	..	..	..	46.7	95	92	90	6.0	4.0
1st Ratoons									
Cane	..	..	..	33.6	117	105	96	6.3	—
Sucrose	..	..	..	13.2	91	94	97	4.6	—
Sugar	..	..	..	4.4	94	102	108	10.2	—
Summary:									
Cane	..	..	..	38.8	101	96	98	5.3	1.9
Sucrose	..	..	..	13.6	100	101	100	4.1	0.3
Sugar	..	..	..	5.3	97	91	94	6.3	4.6
2nd Ratoons									
Cane	..	..	..	37.1	107	98	91	5.7	—
Sucrose	..	..	..	12.4	90	85	100	3.2	—
Sugar	..	..	..	4.6	99	92	89	8.4	—
Summary:									
Cane	..	..	..	38.1	98	96	97	10.5	—
Sucrose	..	..	..	12.5	104	96	104	5.3	—
Sugar	..	..	..	4.8	102	93	102	9.9	—

21. Worthy Park—Cocoa Walk 3 (B41227)

										CANE L ₁	Mean
				N	S	N	D	B ₀	B ₁	L ₀	
Spring Plants											
N ₀	..	..	..	37.5	103	37.3	104	37.8	86	34.3	122
N ₁	..	..	..	98	109	102	107	100	89	104	123
B ₀	..	..	..	36.4	108	36.2	106	—	—	—	—
B ₁	..	..	..	90	92	87	92	—	—	—	—
L ₀	..	..	..	33.7	107	33.5	109	34.7	86	—	—
L ₁	..	..	..	121	129	124	127	118	105	—	—
Mean	..	..	..	34.6	105	34.5	106	37.9	87	35.0	120
				Normal vs. deep knifing				Normal vs. subsoil fertilizer placement			
				A		B		A		B	
S.E. % g.m.	..	..	..	12.0		8.9		9.5		10.0	
Sig. Diff.	..	..	..	K	N	B	L	P	N	B	L
				—	—	4.5	4.0	4.8	—	5.0	4.5

CANE										

CANE						
			A	B	C	D
2nd Ratoons						
4 ft.	..	..	37.9	114	107	131
5 ft.	..	..	125	135	128	126
6 ft.	..	..	105	111	111	104
Mean	..	..	41.7	109	105	110
S.E. % g.m.			Planting		Spacing	
Sig. Diff.			10.2		21.8	
A = Planting double type straight 2 ft. apart					4 ft. = 6 rows x 4 ft.	
B = " single " " 1 ft. "					5 ft. = 5 rows x 5 ft.	
C = " " " 9 in. staggered 1 ft. apart					6 ft. = 4 rows x 6 ft.	
D = " " " 18 in. " 1 ft. "						

CANE						
			A	B	C	D
3rd Ratoons						
4 ft.	..	..	37.3	105	100	102
5 ft.	..	..	96	102	102	90
6 ft.	..	..	94	102	90	95
Mean	..	..	36.1	106	101	99
S.E. % g.m.			Planting		Spacing	
Sig. Diff.			9.7		6.5	

CANE						
			A	B	C	D
4th Ratoons						
4 ft.	..	..	37.3	108	107	109
5 ft.	..	..	103	106	114	114
6 ft.	..	..	100	104	94	103
Mean	..	..	37.7	105	104	107
S.E. % g.m.			Planting		Spacing	
Sig. Diff.			12.1		7.2	
A = Planting double type straight 2 ft. apart					4 ft. = 6 rows x 4 ft.	
B = " single " " 1 ft. "					5 ft. = 5 rows x 5 ft.	
C = " " " 9 ft. staggered 1 ft. apart					6 ft. = 4 rows x 6 ft.	
D = " " " 18 ft. " " "						

23. Monymusk—Springfield—Beauchamp—Paradise 11 (B41227)

						S.E. %	Sig. Diff.
						g.m.	
Spring Plants							
Cane	..	..	54.8	95	97	90	97
Sucrose	..	..	12.0	104	99	95	100
Sugar..	..	..	6.6	99	95	85	97
1st Ratoons							
Cane	..	..	36.5	95	92	99	93
Sucrose	..	..	7.5	109	114	96	102
Sugar..	..	..	2.7	104	106	95	95
1 = Normal irrigation.						4 = Long line irrigation (alternate rows wet).	
2 = Long line " (Bank planted).						5 = " " " (double 9 ft. bank).	
3 = " " " (Furrow planted).							
2nd Ratoons						S.E. %	Sig. Diff.
						g.m.	
Cane	..	..	22.7	117	103	112	111
Sucrose	..	..	8.3	95	104	101	94
Sugar..	..	..	1.9	111	107	112	102

PART 5

DISEASE EXPERIMENTS

(1) RATOON STUNTING

1. Long Pond—Gibraltar 2 (Co421)

		Not inoculated	Inoculated (A)	Not heat treated	Heat treated (B)	Diseased setts	Healthy setts (C)	S.E. % g.m.	Sig. Diff.		
									A	B	C
Spring Plants											
Cane	..	31.1	95	28.8	110	29.7	104	8.5	—	7.8	—
Sucrose	..	9.0	102	9.8	87	9.2	99	13.2	—	7.4	—
Sugar	..	2.8	95	2.8	95	2.7	104	16.1	—	—	—
1st Ratoons											
Cane	..	31.0	93	28.0	113	26.1	129	16.9	—	—	17.0
2nd Ratoons											
Cane	..	29.2	112	28.9	114	34.2	81	25.3	—	—	—
Sucrose	..	11.9	99	11.7	103	11.8	101	8.4	—	—	—
Sugar	..	3.5	112	3.4	117	4.0	82	23.6	—	—	—
3rd Ratoons											
Cane	..	21.5	92	19.7	109	20.7	100	8.8	—	7.4	8.0
4th Ratoons											
Cane	..	24.6	103	23.7	110	24.3	105	18.2	—	—	—
Sucrose	..	9.7	113	10.7	93	10.6	95	5.9	5.6	5.0	—
Sugar	..	2.4	117	2.6	102	2.6	102	21.6	—	—	—

2. Worthy Park—Bullet Tree 1.

										CANE					
										DD	Nemagon	EDB	Chlorodane	Dieldrin	BHC
Spring Plants															
B41227	0	..	..	..	..	..	..	..	..	34.2	37.6	34.5	26.8	31.8	36.6
	1	..	..	..	..	..	..	..	..	130	133	113	156	133	102
	2	..	..	..	..	..	..	..	..	166	128	112	154	126	106
B4362	0	..	..	..	..	..	..	..	..	7.5	14.9	11.9	13.0	11.2	14.0
	1	..	..	..	..	..	..	..	..	240	132	120	142	125	92
	2	..	..	..	..	..	..	..	..	336	139	124	174	134	86
S.E. % g.m.	(a)	..	..	..	..	..	..	..	..	48.9	76.5	48.4	20.0	41.8	53.0
	(b)	..	..	..	..	..	..	..	..	41.0	13.4	46.0	53.4	27.1	46.8
	(c)	..	..	..	..	..	..	..	..	27.4	15.9	23.9	26.8	17.5	18.6
Sig. diff.	(a)	..	..	..	..	..	..	..	..	78.1	—	63.0	35.6	59.5	64.5
	(b)	..	..	..	..	..	..	..	..	—	12.8	—	—	—	—
	(c)	..	..	..	..	..	..	..	..	21.3	11.6	—	23.5	12.1	—
1st Ratoon															
B41227	0	..	..	..	..	..	..	..	..	93.8	90.7	91.8	92.8	94.9	91.8
	1	..	..	..	..	..	..	..	..	109	107	103	94	98	104
	2	..	..	..	..	..	..	..	..	109	103	101	104	101	102
B4362	0	..	..	..	..	..	..	..	..	47.1	60.9	53.3	54.4	49.2	52.6
	1	..	..	..	..	..	..	..	..	119	97	105	103	107	98
	2	..	..	..	..	..	..	..	..	132	94	110	115	115	113
S.E. % g.m.	(a)	..	..	..	..	..	..	..	..	7.2	15.6	8.3	12.8	4.9	12.0
	(b)	..	..	..	..	..	..	..	..	12.0	9.4	5.9	11.6	12.9	10.4
	(c)	..	..	..	..	..	..	..	..	6.8	7.3	7.3	9.3	15.4	10.3
Sig. diff.	(a)	..	..	..	..	..	..	..	..	10.4	23.1	11.8	18.2	6.6	17.0
	(b)	..	..	..	..	..	..	..	..	—	—	5.4	—	—	—
	(c)	..	..	..	..	..	..	..	..	4.8	—	—	6.5	—	—

(ii) RESULTS OF SOIL FUMIGATION EXPERIMENTS

A summary of the results of soil fumigation experiments reaped in 1959 is presented below. Yields, % sucrose and tons sugar per acre are expressed as percentages of the control plot figures. D.D. was applied at 40 gal. per acre and the other fumigants at 10 gal. per acre.

Fumigant treatment							Tons cane per acre	% Sucrose	Tons sugar per acre
1. Appleton—Appleton—Bailey Piece No. 2									
Control	..	..	..	..	..	..	16.0	13.31	2.14
D.D.	..	..	..	..	..	..	109	103	112
Nemagon	..	..	..	..	..	..	117	107	125
S.E. % g.m.	..	..	..	..	..	..	14.5	4.5	16.2
2. Bernard Lodge—Salt Pond—35A									
Control	..	..	..	..	..	..	26.5	11.0	2.92
D.D.	..	..	..	..	..	..	102	109	111
Nemagon	..	..	..	..	..	..	111	102	112
S.E. % g.m.	..	..	..	..	..	..	12.6	4.6	10.8
3. Bernard Lodge—Salt Pond—40G									
Control	..	..	..	..	..	..	19.2	10.96	2.16
D.D.	..	..	..	..	..	..	115	102	113
Nemagon	..	..	..	..	..	..	124	102	126
S.E. % g.m.	..	..	..	..	..	..	27.36	6.76	28.09
4. Bernard Lodge—March Pen—22A									
Control	..	..	..	..	..	..	17.9	—	—
D.D.	..	..	..	..	..	..	124	—	—
Nemagon	..	..	..	..	..	..	127	—	—
S.E. % g.m.	..	..	..	..	..	..	9.42	—	—
5. Bernard Lodge—March Pen—22C									
Control	..	..	..	..	..	..	16.7	—	—
D.D.	..	..	..	..	..	..	148	—	—
Nemagon	..	..	..	..	..	..	136	—	—
S.E. % g.m.	..	..	..	..	..	..	16.20	—	—
6. Caymanas—Dawkins—Section 19									
Control	..	..	..	..	..	..	40.1	—	—
D.D.	..	..	..	..	..	..	108	—	—
E.D.B.*	..	..	..	..	..	..	117	—	—
S.E. % g.m.	..	..	..	..	..	..	8.09	—	—
* Ethylene dibromide.									
7. Caymanas—Farm 2—Fobway 4									
Control	..	..	..	..	..	..	35.7	7.59	2.72
D.D.	..	..	..	..	..	..	118	97	114
Fumazone	..	..	..	..	..	..	119	108	127
S.E. % g.m.	..	..	..	..	..	..	14.98	8.83	17.10
8. Frome—Fontabelle—Chambers									
Control	..	..	..	..	..	..	65.30	14.20	9.26
D.D.	..	..	..	..	..	..	108	106	102
Nemagon	..	..	..	..	..	..	112	100	113
S.E. % g.m.	..	..	..	..	..	..	9.05	7.10	3.46
9. Frome—Barham—Sink Hole									
Control	..	..	..	..	..	..	50.7	11.15	5.67
D.D.	..	..	..	..	..	..	112	94	119
Nemagon	..	..	..	..	..	..	95	93	102
S.E. % g.m.	..	..	..	..	..	..	11.26	4.37	13.30

Fumigant treatment							Tons cane per acre	% Sucrose	Tons sugar per acre
10. Frome—Friendship—Potato Piece									
Control	..	..	..	..	..	..	48.7	12.80	6.32
D.D.	..	..	..	..	..	..	98	106	90
Nemagon	..	..	..	..	..	..	109	106	102
S.E. % g.m.	..	..	..	..	..	..	15.52	7.88	19.80
11. Frome—Cornwall—Pasture Piece No. 1									
Control	..	..	..	..	..	..	72.6	14.14	10.24
D.D.	..	..	..	..	..	..	104	100	106
Nemagon	..	..	..	..	..	..	108	104	105
S.E. % g.m.	..	..	..	..	..	..	15.95	2.80	21.13
12. Frome—Shrewsbury—Water Ground No. 7									
Control	..	..	..	..	..	..	49.0	10.24	5.03
D.D.	..	..	..	..	..	..	125	99	127
Nemagon	..	..	..	..	..	..	112	94	120
S.E. % g.m.	..	..	..	..	..	..	15.0	9.63	5.72
13. Frome—Retrieve—Gill Piece									
Control	..	..	..	..	..	..	37.3	12.38	4.64
D.D.	..	..	..	..	..	..	107	100	107
Nemagon	..	..	..	..	..	..	107	101	106
S.E. % g.m.	..	..	..	..	..	..	8.52	7.60	14.13
14. Frome—Masemure—Myrie Top									
Control	..	..	..	..	..	..	27.8	15.27	4.25
D.D.	..	..	..	..	..	..	124	99	126
Nemagon	..	..	..	..	..	..	135	103	131
S.E. % g.m.	..	..	..	..	..	..	9.60	4.55	10.16
15. Frome—Albany—Spring Piece									
Control	..	..	..	..	..	..	33.3	15.08	5.03
D.D.	..	..	..	..	..	..	105	100	105
Nemagon	..	..	..	..	..	..	98	98	100
S.E. % g.m.	..	..	..	..	..	..	4.63	3.04	6.60
16. Frome—Midgham—Great House									
Control	..	..	..	..	..	..	32.1	13.99	4.48
D.D.	..	..	..	..	..	..	85	93	92
Nemagon	..	..	..	..	..	..	92	92	99
S.E. % g.m.	..	..	..	..	..	..	11.61	5.70	9.50
17. Frome—Mint—Peter Piece									
Control	..	..	..	..	..	..	48.6	9.51	4.72
D.D.	..	..	..	..	..	..	99	86	113
Nemagon	..	..	..	..	..	..	108	81	130
S.E. % g.m.	..	..	..	..	..	..	18.23	15.99	18.92
18. Frome—Mount Eagle—Garden Piece									
Control	..	..	..	..	..	..	37.4	15.02	5.62
D.D.	..	..	..	..	..	..	103	97	108
Nemagon	..	..	..	..	..	..	104	95	110
S.E. % g.m.	..	..	..	..	..	..	5.28	4.89	8.13
19. Frome—Meylersfield—Big Pasture									
Control	..	..	..	..	..	..	36.9	13.40	4.98
D.D.	..	..	..	..	..	..	99	96	103
Nemagon	..	..	..	..	..	..	94	99	95
S.E. % g.m.	..	..	..	..	..	..	5.72	6.40	9.64

	Fumigant treatment	Tons cane per acre	% Sucrose	Tons sugar per acre
20. Frome—Paul Island—Soffrey Common				
	Control	50.9	13.89	7.07
	D.D.	92	101	91
	Nemagon	82	99	84
	S.E. % g.m.	11.70	5.38	9.95
21. Frome—Belle Isle—Rugland				
	Control	45.6	14.66	6.70
	D.D.	101	103	98
	Nemagon	117	105	111
	S.E. % g.m.	6.22	3.79	6.55
22. Frome—Blue Castle—School House No. 3				
	Control	44.7	13.02	5.81
	D.D.	130	94	139
	Nemagon	118	95	123
	S.E. % g.m.	21.16	6.47	15.48
23. Gray's Inn Central—Gibraltar—Section 12				
	Control	30.6	—	—
	D.D.	115	—	—
	Nemagon	111	—	—
	S.E. % g.m.	10.43	—	—
24. Hampden—Gayles Valley—Gallowasp No. 1				
	Control	23.2	—	—
	D.D.	114	—	—
	Nemagon	119	—	—
	S.E. % g.m.	6.33	—	—
25. Hampden—Gayles Valley—Great House				
	Control	22.1	—	—
	D.D.	121	—	—
	Nemagon	120	—	—
	S.E. % g.m.	14.80	—	—
26. Innswood—Jackson Road No. 16				
	Control	33.7	—	—
	D.D.	87	—	—
	E.D.B.	83	—	—
	S.E. % g.m.	15.38	—	—
27. Innswood—Jackson Road No. 19				
	Control	30.3	—	—
	D.D.	103	—	—
	E.D.B.	105	—	—
	S.E. % g.m.	11.95	—	—
28. Monymusk—Exeter—Exeter—Section 86				
	Control	31.1	11.06	3.45
	D.D.	102	102	105
	Nemagon	108	98	106
	S.E. % g.m.	11.05	4.06	13.37
29. Monymusk—Exeter—Exeter—Section 89				
	Control	36.4	9.41	3.42
	D.D.	105	105	110
	Nemagon	120	100	120
	S.E. % g.m.	10.23	8.88	11.00

	Fumigant treatment						Tons cane per acre	% Sucrose	Tons sugar per acre
30. Monymusk—Exeter—Vizzard's Run—Section 7B									
Control	..	..	..	..	..	..	39.5	—	—
D.D.	..	..	..	..	..	..	99	—	—
Nemagon	..	..	..	..	..	..	96	—	—
S.E. % g.m.	..	..	..	..	..	..	15.73	—	—
31. Monymusk—Springfield—Springfield No. 2—Section 22									
Control	..	..	..	..	..	..	37.8	—	—
D.D.	..	..	..	..	..	..	80	—	—
Nemagon	..	..	..	..	..	..	96	—	—
S.E. % g.m.	..	..	..	..	..	..	21.71	—	—
32. Ramble Cane Farm—Commodore No. 2									
Control	..	..	..	..	..	..	22.41	—	—
D.D.	..	..	..	..	..	..	158	—	—
Nemagon	..	..	..	..	..	..	185	—	—
S.E. % g.m.	..	..	..	..	..	..	11.30	—	—
33. Rose Hall—Spring—Red Girl									
Control	..	..	..	..	..	..	21.33	—	—
D.D.	..	..	..	..	..	..	119	—	—
Nemagon	..	..	..	..	..	..	112	—	—
S.E. % g.m.	..	..	..	..	..	..	8.49	—	—
34. Serge Island—Serge Island—Tobacco No. 2									
Control	..	..	..	..	..	..	35.2	13.94	4.84
D.D.	..	..	..	..	..	..	122	105	130
Nemagon	..	..	..	..	..	..	108	107	116
S.E. % g.m.	..	..	..	..	..	..	11.83	5.44	3.43
35. Serge Island—Serge Island—McDonald									
Control	..	..	..	..	..	..	29.7	9.41	2.64
D.D.	..	..	..	..	..	..	129	105	140
Nemagon	..	..	..	..	..	..	109	100	122
S.E. % g.m.	..	..	..	..	..	..	18.15	8.88	19.43
36. Sevens—Parnassus—Section 53									
Control	..	..	..	..	..	..	31.7	—	—
D.D.	..	..	..	..	..	..	100	—	—
Nemagon	..	..	..	..	..	..	96	—	—
S.E. % g.m.	..	..	..	..	..	..	11.71	—	—
37. Trelawny Estates—Georgia—Prickly Yellow									
Control	..	..	..	..	..	..	13.6	—	—
D.D.	..	..	..	..	..	..	105	—	—
Nemagon	..	..	..	..	..	..	109	—	—
S.E. % g.m.	..	..	..	..	..	..	11.92	—	—
38. Trelawny Estates—Long Pond—Plantain Walk									
Control	..	..	..	..	..	..	34.4	9.30	3.21
D.D.	..	..	..	..	..	..	153	114	174
Fumazone	..	..	..	..	..	..	141	102	143
S.E. % g.m.	..	..	..	..	..	..	3.71	12.45	13.41
39. Trelawny Estates—Long Pond—Jack Pasture									
Control	..	..	..	..	..	..	44.9	10.26	4.60
D.D.	..	..	..	..	..	..	103	98	101
Fumazone	..	..	..	..	..	..	81	105	85
S.E. % g.m.	..	..	..	..	..	..	4.14	7.53	8.11

Fumigant treatment							Tons cane per acre	% Sucrose	Tons sugar per acre
40. Trelawny Estates—Long Pond—Blue Man									
Control	..	..	..	..	..	..	43.4	9.90	4.28
D.D.	..	..	..	..	..	..	162	86	139
Fumazone	..	..	..	..	..	..	151	95	147
S.E. % g.m.	..	..	..	..	..	..	7.63	14.35	16.49
41. Trelawny Estates—Hyde Hall—Gallimore..									
Control	..	..	..	..	..	..	61.2	10.50	6.49
D.D.	..	..	..	..	..	..	89	79	73
Fumazone..	..	..	..	..	..	..	98	88	85
S.E. % g.m.	..	..	..	..	..	..	15.81	12.21	24.12
42. United Estates—Bybrook—Bravo Piece									
Control	..	..	..	..	..	..	47.4	—	—
D.D.	..	..	..	..	..	..	103	—	—
Nemagon	..	..	..	..	..	..	106	—	—
S.E. % g.m.	..	..	..	..	..	..	16.63	—	—
43. United Estates—Bybrook—Race Course No. 4									
Control	..	..	..	..	..	..	54.2	—	—
D.D.	..	..	..	..	..	..	104	—	—
Nemagon	..	..	..	..	..	..	102	—	—
S.E. % g.m.	..	..	..	..	..	..	17.19	—	—

APPENDIX III

PART 1

FACTORY DATA COMPARED BY CROPS

TABLE I
JUICE QUALITY. CROPS 1955-59

	1955	1956	1957	1958	1959
Cane, Pol %	12.83	12.78	12.43	12.15	11.76
Absolute Juice—°Brix	18.14	17.92	17.70	17.49	17.01
Purity	82.73	82.98	81.89	80.97	80.10

TABLE II
MILLING FIGURES. CROPS 1955-59

	1955	1956	1957	1958	1959
Tons cane per hour (TCH)	59.56	61.40	64.34	61.93	64.46
Tons fibre per hour (TFH)	8.64	8.66	9.17	8.80	9.15
Imbibition % Fibre	134.11	126.78	127.71	127.58	131.14
Reduced Pol Extraction	95.21	94.99	94.72	95.01	94.65
Absolute Juice lost % Fibre (pol basis) ..	33.52	35.09	36.95	34.90	37.46
Pol % Bagasse	2.47	2.55	2.60	2.60	2.48

TABLE III
LIME CONSUMPTION IN JAMAICAN FACTORIES. CROPS 1955-59

	Lbs. CaO/Ton Cane					Lbs. CaO/Ton Non-pol				
	1955	1956	1957	1958	1959	1955	1956	1957	1958	1959
Monymusk	2.99*	3.84*	4.90*	5.24*	3.35*	102.7*	134.3*	157.83*	176.11*	108.97*
Richmond/Llandovery	1.78	1.78	1.64	1.48	1.82	75.0	75.7	68.42	50.80	73.46
Jamaica Sugar Estates.. .. .	1.30	1.28	1.15	0.92	1.05	60.0	59.2	47.45	34.56	39.48
Frome	1.12	0.94	1.14	1.09	1.12	46.8	39.4	47.83	42.90	41.28
New Yarmouth	1.52	1.39	1.49	1.30	1.33	58.7	54.5	57.24	48.25	49.29
Caymanas	1.07	1.22	1.21	1.67	1.51	44.1	50.7	50.88	70.14	63.22
Innswood	0.98	0.98	0.78	0.89	1.16	44.5	44.7	31.23	34.02	43.45
Barnett	1.04	0.77	0.57	0.69	1.19	49.0	36.5	26.08	29.86	50.35
Worthy Park	0.93	1.16	1.56	1.23	1.28	49.5	58.8	77.16	56.19	56.19
Rose Hall	0.92	0.77	0.67	0.62	0.92	36.5	36.0	28.03	24.54	34.35
Gray's Inn Central	1.51	1.21	1.15	1.26	0.92	59.2	47.1	40.86	45.28	34.71
Sevens	0.92	1.05	1.39	0.69	1.11	38.6	45.4	55.93	25.69	38.37
Bybrook	1.29	1.05	0.99	1.45	0.90	58.8	47.1	45.83	63.08	36.48
Serge Island	1.35	1.66	1.50	2.09	1.50	60.9	83.7	74.69	96.72	65.76
Vale Royal	1.21	1.23	1.42	0.96	0.95	56.9	60.3	61.19	41.33	39.29
Appleton.. .. .	0.78	1.25	0.66	0.89	1.62	40.5	58.8	30.07	37.99	73.38
Hampden	1.11	0.73	1.04	0.69	0.64	47.0	36.8	45.41	27.50	28.21
Bernard Lodge	1.72	1.60	1.41	1.44	1.53	71.9	69.9	59.40	56.70	54.72
Holland	1.53	1.01	1.04	1.39	1.32	60.8	38.3	40.28	46.95	47.80
Long Pond	1.47	1.95	1.88	1.78	1.62	45.1	96.0	84.93	77.96	70.95

* Includes Refinery Consumption.

TABLE IV
HEATER CAPACITIES. JAMAICAN FACTORIES. CROPS 1955-59

Factory	Cu. ft. M.Jc/Sq. ft. H.S./Hr.				
	1955	1956	1957	1958	1959
Monymusk	1.00	0.97	0.95	0.92	0.99
Richmond/Llandoverly	1.31	1.32	1.15	1.29	1.10
Jamaica Sugar Estates	1.22	1.31	1.34	1.27	1.33
Frome	0.79	0.78	1.01	0.96	0.96
New Yarmouth	1.17	1.15	1.11	1.13	1.22
Caymanas	0.94	0.95	0.96	0.92	1.00
Innswood	1.20	1.16	0.82	1.83	0.93
Barnett	0.83	1.15	0.81	0.77	0.82
Worthy Park	1.03	1.10	0.74	0.76	0.85
Rose Hall	0.50	0.54	0.77	0.82	0.79
Gray's Inn Central	1.03	1.01	0.97	1.00	1.02
Sevens	0.98	0.89	1.04	1.05	1.07
Bybrook	0.82	0.88	0.84	0.82	0.84
Serge Island	1.08	0.95	0.95	1.13	0.88
Vale Royal	1.21	1.03	0.78	0.82	0.79
Appleton	0.83	0.84	0.97	0.99	0.97
Hampden	0.78	0.84	1.60	1.57	1.95
Bernard Lodge	0.91	0.97	1.00	0.96	1.00
Holland	0.65	0.45	0.72	0.63	0.70
Long Pond	0.68	0.62	0.67	0.59	0.67

TABLE V
ROTARY FILTER PERFORMANCE. CROPS 1955-59

Factory	Sq. ft. FA/TCH					Pol in Cake % Pol in Cane				
	1955	1956	1957	1958	1959	1955	1956	1957	1958	1959
Monymusk	3.69	3.77	3.70	3.81	3.63	0.43	0.49	0.54	0.60	0.63
Richmond/Llandoverly	—	—	—	—	—	0.49	0.56	0.69	0.78	0.69
Jamaica Sugar Estates	—	—	—	—	4.94	0.48	0.56	0.53	0.56	0.27
Frome	3.81	3.79	3.70	3.88	3.78	0.22	0.21	0.20	0.22	0.23
New Yarmouth	4.78	4.74	4.92	4.73	4.71	0.45	0.43	0.60	0.58	0.64
Caymanas	5.35	5.23	5.22	5.22	4.65	0.33	0.46	0.43	0.51	0.37
Innswood	3.66	3.82	3.58	3.45	3.33	0.35	0.26	0.27	0.35	0.34
Barnett	5.34	4.92	4.72	5.03	4.87	0.35	0.36	0.37	0.58	0.52
Worthy Park	—	—	—	—	—	0.30	0.49	0.64	0.55	0.53
Rose Hall	—	5.75	5.40	5.37	5.50	0.53	0.39	0.37	0.24	0.28
Gray's Inn Central	6.29	6.33	6.49	6.37	6.34	0.63	0.46	0.69	0.56	0.67
Sevens	3.26	3.52	3.21	3.25	3.16	0.34	0.26	0.39	0.38	0.37
Bybrook	3.55	3.20	3.21	3.28	3.26	0.33	0.33	0.54	0.50	0.44
Serge Island	7.55	8.19	8.37	8.01	6.88	0.79	0.80	0.67	0.46	0.40
Vale Royal	6.37	6.04	5.63	5.43	5.54	0.62	0.43	0.35	0.44	0.82
Appleton	3.84	3.84	3.22	3.23	3.18	0.13	0.23	0.25	0.28	0.29
Hampden	6.06	5.51	5.57	5.63	5.20	0.40	0.76	0.62	0.92	0.65
Bernard Lodge	5.53	5.22	5.17	5.28	4.90	0.42	0.26	0.44	0.51	0.44
Holland	—	—	—	—	—	0.57	0.48	0.54	0.63	0.60
Long Pond	—	—	—	—	—	0.54	0.52	0.51	0.48	0.51

TABLE VI
FILTER STATION CONTROL FIGURES. CROPS 1955-59

	1955	1956	1957	1958	1959
Pol % Mud	1.84	2.06	2.11	2.27	2.01
Mud % Cane	2.43	2.51	2.55	2.49	2.60
Pol in Mud % Pol in Cane	0.35	0.40	0.43	0.47	0.44

TABLE VII
EVAPORATION RATES (AS LBS. EVAP./SQ. FT. H.S./HR.). CROPS 1955-59

Factory	°Brix Syrup					Lbs./Sq. ft. H.S./Hr.				
	1955	1956	1957	1958	1959	1955	1956	1957	1958	1959
Monymusk	54.92	57.87	57.76	55.90	55.87	7.17	6.99	6.87	6.69	7.25
Richmond/Llandovery ..	60.45	59.99	61.24	65.87	66.92	8.09	7.13	6.89	8.39	7.22
Jamaica Sugar Estates ..	56.59	57.41	62.14	58.64	61.31	5.67	6.33	6.63	6.05	6.68
Frome	59.89	57.63	54.43	59.18	60.04	7.94	7.67	7.70	7.41	7.57
New Yarmouth	63.42	62.99	60.36	61.76	61.20	7.62	7.40	7.16	6.54	8.16
Caymanas	62.12	64.12	61.39	62.33	63.11	5.02	4.59	4.57	4.49	4.83
Innswood	57.37	56.42	57.20	58.27	59.07	6.84	6.66	7.08	6.36	7.20
Barnett	59.13	59.40	57.67	57.17	58.14	7.53	8.26	8.30	7.75	8.55
*Worthy Park	62.08	62.40	53.11	61.51	58.84	5.75	6.15	6.16	6.77	7.49
Rose Hall	63.37	61.53	58.97	65.42	63.28	8.01	8.45	6.46	6.67	6.43
Gray's Inn Central ..	54.83	56.25	59.52	57.51	61.05	5.66	5.70	5.42	5.76	6.00
Sevens	64.78	65.47	62.06	66.90	67.08	6.63	6.75	7.00	7.22	7.30
Bybrook	65.24	68.19	69.14	67.45	66.02	9.81	9.87	10.02	9.54	9.79
Serge Island	54.30	54.32	53.33	57.31	61.25	9.02	8.06	7.89	8.82	7.56
Vale Royal	61.28	59.28	62.05	59.95	60.20	7.22	7.63	8.13	8.57	8.66
*Appleton	48.82	58.26	57.57	64.36	60.46	7.34	7.61	9.23	6.92	6.93
Hampden	59.96	60.22	60.91	59.41	65.31	7.27	7.75	7.89	8.04	6.98
Bernard Lodge	61.91	65.46	62.26	64.30	62.33	5.08	5.57	5.61	5.48	5.59
Holland	60.35	57.35	62.43	61.08	61.01	5.02	5.05	5.65	4.92	5.54
Long Pond	58.95	56.20	52.49	51.83	54.24	8.90	8.48	7.52	7.01	8.30

* Quintuple effect.

TABLE VIII
POLARIZATIONS, MOISTURES, SAFETY FACTORS AND PERMISSIBLE MOISTURES—EXPORT SUGAR. CROPS 1955-59

Factory	°Polarization					% Moisture				
	1955	1956	1957	1958	1959	1955	1956	1957	1958	1959
Monymusk	96.49	97.97	97.09	97.03	96.75	0.96	0.58	0.67	0.75	0.77
Richmond/Llandovery ..	—	96.70	—	—	—	—	0.87	—	—	—
Jamaica Sugar Estates ..	—	97.58	—	97.18	97.14	—	0.94	—	0.93	0.86
Frome	96.57	96.87	96.75	96.82	96.51	0.94	0.82	0.73	0.76	0.83
New Yarmouth	97.68	97.74	97.71	97.44	97.40	0.58	0.55	0.60	0.72	0.75
Caymanas	97.21	97.38	97.52	97.24	97.44	—	—	0.80	0.80	0.84
Innswood	97.28	97.09	97.20	97.13	96.44	0.90	0.86	0.85	0.71	0.90
Barnett	97.09	97.64	97.80	97.28	97.32	0.99	0.96	0.80	0.72	0.73
Worthy Park	97.21	97.11	97.12	97.20	96.62	1.03	0.99	1.00	0.99	0.90
Rose Hall	97.09	97.25	97.12	97.18	97.02	0.85	0.80	0.85	0.82	0.82
Gray's Inn Central	97.15	97.21	97.33	96.81	97.00	0.81	0.87	0.80	0.85	0.83
Sevens	97.10	97.33	97.54	97.25	96.55	0.68	0.65	0.64	0.66	0.81
Bybrook	97.05	97.70	97.58	97.43	97.13	0.89	0.84	0.72	0.75	0.77
Serge Island	96.86	97.08	97.32	97.32	97.79	0.92	0.96	0.96	0.79	0.65
Vale Royal	—	97.12	97.19	—	—	—	0.64	0.68	—	—
Appleton	97.42	97.08	97.01	97.31	97.65	0.87	0.84	0.84	0.84	0.78
Hampden	98.10	98.18	98.02	97.58	97.84	0.87	0.88	0.91	0.82	0.76
Bernard Lodge	97.45	97.47	97.72	97.56	97.02	0.90	—	—	0.86	0.98
Holland	96.51	96.91	97.12	96.49	96.58	0.91	0.84	0.84	0.81	0.90
Long Pond	—	97.58	97.22	97.48	97.40	—	0.64	0.64	0.64	0.64

Factory	Safety Factor					Permissible % Moisture				
	1955	1956	1957	1958	1959	1955	1956	1957	1958	1959
Monymusk	0.274	0.286	0.230	0.253	0.236	0.88	0.51	0.73	0.74	0.59
Richmond/Llandovery ..	—	0.264	—	—	0.265	—	0.83	—	—	0.88
Jamaica Sugar Estates ..	—	0.390	—	0.330	0.301	—	0.61	—	0.73	0.72
Frome	0.274	0.262	0.225	0.239	0.237	0.86	0.78	0.81	0.80	0.88
New Yarmouth	0.250	0.243	0.262	0.281	0.291	0.58	0.57	0.57	0.64	0.64
Caymanas	—	—	0.323	—	0.354	0.70	0.66	0.62	—	0.84
Innswood	0.331	0.296	0.304	0.247	0.253	0.68	0.73	0.70	0.72	0.89
Barnett	0.340	0.407	0.364	0.265	0.272	0.73	0.59	0.55	0.68	0.66
Worthy Park	0.369	0.343	0.347	0.354	0.263	0.70	0.72	0.72	0.70	0.79
Rose Hall	0.292	0.291	0.295	0.291	0.275	0.73	0.69	0.72	0.71	0.75
Gray's Inn Central	0.284	0.312	0.300	0.266	0.252	0.71	0.70	0.67	0.80	0.83
Sevens	0.234	0.243	0.260	0.240	0.234	0.73	0.67	0.62	0.69	0.87
Bybrook	0.302	0.365	0.298	0.292	0.265	0.74	0.58	0.61	0.64	0.72
Serge Island	0.293	0.329	0.358	0.295	0.294	0.79	0.73	0.67	0.67	0.55
Vale Royal	—	0.222	0.242	—	0.238	—	0.72	0.70	—	0.72
Appleton	0.337	0.288	0.281	0.312	0.283	0.65	0.73	0.75	0.67	0.74
Hampden	0.456	0.484	0.460	0.339	0.350	0.48	0.46	0.50	0.61	0.54
Bernard Lodge	0.353	—	—	0.352	0.329	0.64	0.63	0.57	0.61	0.75
Holland	0.261	0.272	0.292	0.231	0.263	0.87	0.77	0.72	0.88	0.86
Long Pond	—	0.264	0.230	0.254	0.246	—	0.61	0.70	0.63	0.65

TABLE IX
PER CENT. GROSS GRINDING TIME. CROPS 1955-59

	1955	1956	1957	1958	1959
Non-Factory Stoppages	14.81	15.41	20.47	19.91	20.39
Factory Stoppages	7.20	7.66	7.84	7.93	7.17
Time Grinding	77.99	76.93	71.69	72.16	72.44

TABLE X
POL BALANCE (% POL IN CANE). CROPS 1955-59

	1955	1956	1957	1958	1959
Pol in Sugars	84.48	84.82	83.39	82.72	82.26
Pol in Bagasse	5.69	5.75	6.14	6.29	6.20
Pol in Molasses	7.97	7.64	8.06	8.70	9.05
Pol in Filter Cake	0.35	0.40	0.43	0.47	0.44
Pol in Undetermined	1.51	1.39	1.98	1.82	2.05

TABLE XI
COMPARATIVE CONTROL FIGURES. CROPS 1955-59

	1955	1956	1957	1958	1959
Pol % Cane	12.83	12.78	12.43	12.15	11.76
Mixed Juice—Purity	83.17	83.38	82.29	81.82	80.50
Tons Cane/Ton 96° Sugar	8.86	8.86	9.26	9.50	9.89
Boiling House Efficiency (W.C.)	97.46	97.78	97.22	96.36	97.09
Pol in Sugars % Pol in Cane	84.48	84.48	83.39	82.72	82.26
Pol in Molasses % Pol in Cane	7.97	7.64	8.06	8.70	9.05

TABLE XII
MOLASSES FACTORS. CROPS 1955-59

Factory	1955	1956	1957	1958	1959
Monymusk	45.25	44.11	46.14	46.85	43.07
Richmond/Llandoverly	40.57	40.49	39.40	38.84	43.05
Jamaica Sugar Estates	38.89	39.30	40.04	40.49	37.88
Frome	37.76	38.64	37.02	36.89	37.42
New Yarmouth	38.78	37.61	37.44	38.28	40.86
Caymanas	40.15	38.92	40.05	43.23	46.40
Innswood	57.14	49.76	45.55	31.51	35.70
Barnett	44.81	37.74	38.01	42.82	39.66
Worthy Park	45.20	37.90	37.89	40.71	39.31
Rose Hall	44.45	38.71	36.13	38.48	37.39
Gray's Inn Central	42.62	40.42	36.44	44.79	40.59
Sevens	36.78	40.68	39.28	40.33	39.91
Bybrook	36.77	37.88	40.86	41.97	41.64
Serge Island	38.99	45.03	42.33	41.65	41.33
Vale Royal	38.06	36.69	36.18	40.11	38.86
Appleton	30.12	30.03	40.35	31.89	33.09
Hampden	46.91	48.53	38.96	45.12	44.08
Bernard Lodge	43.24	38.16	42.51	42.38	38.81
Holland	40.11	35.70	39.00	44.45	40.10
Long Pond	27.06	36.80	36.78	39.09	38.20

TABLE XIII
QUALITY OF CANE SUPPLIED TO JAMAICAN FACTORIES, EXPRESSED AS POSSIBLE TONS CANE/TON 96° SUGAR
(Calculated on a basis of assumed Mill Extraction of 96.50, a B.H.E. (Winter Carp) of 100 and Pol % Cane and Purity of Mixed Juice as reported.)
(Calculated on Copp's Tables—Spencer Meade, page 762.)

Factory	1955	1956	1957	1958	1959	5 Year Averages
Monymusk	9.08	8.85	9.41	9.94	10.53	9.56
Richmond/Llandoverly	8.62	8.49	8.35	10.69	9.41	9.11
Jamaica Sugar Estates	8.34	8.84	8.73	9.53	9.72	9.03
Frome	8.04	8.07	8.89	8.30	9.62	8.58
New Yarmouth	8.26	8.22	8.69	9.24	8.96	8.67
Caymanas	8.30	8.48	8.46	9.59	9.33	8.83
Innswood	8.01	8.48	8.43	9.61	9.08	8.72
Barnett	8.05	7.86	8.10	7.89	8.51	8.08
Worthy Park	6.89	7.08	7.15	7.35	7.58	7.21
Rose Hall	8.10	7.82	8.46	8.22	8.99	8.32
Gray's Inn Central	9.29	9.67	9.12	10.63	10.71	9.88
Sevens	8.36	8.55	8.65	9.08	8.98	8.72
Bybrook	7.88	7.81	7.96	8.00	8.42	8.01
Serge Island	7.78	8.11	7.90	8.00	8.21	8.00
Vale Royal	8.53	8.44	8.47	8.89	8.59	8.78
Appleton	7.85	7.79	8.31	7.77	8.05	7.95
Hampden	8.19	7.64	8.09	8.68	8.98	8.32
Bernard Lodge	8.12	8.23	8.08	8.83	8.67	8.39
Holland	8.11	8.84	8.36	8.82	8.98	8.62
Long Pond	8.64	8.77	8.81	9.23	9.99	9.09
Island Averages	8.33	8.35	8.65	8.88	9.25	8.69

FACTORY DATA-1959 CROP

TABLE I
FACTORY EQUIPMENT DATA—1959 CROP
(As Reported by the Factories)

Factories	Width Carrier	Knives		Crushers and Mills	Total Rolls	Remarks
		Setts	Blades/Sett H.P.			
Monymusk	78"	2	38/38 200/200	3 RC 36 $\frac{1}{2}$ " $\times$ 78", 16 RM 36" $\times$ 78"	18	New equipment installed and used during 1959 crop: pipe line for use of flue gases for carbonatation instead of lime in 1960 crop; improvement in quality of liquor and sugar, and in the use of steam; installation of two new 200 h.p. boilers; modifications to chimneys and chimneys for furnaces of two boilers. Modifications to refinery for continuous instead of batch carbonatation including installation of two auto filters and modifications to pumps to handle higher brine liquors. Fork lift trucks and pallets for handling refined sugar in bags. Foxboro control of liming of raw juice, and change from hot to cold liming. Automation of mixed juice weighing, using pneumatic system of sealed weighing bags, 240 lb. capacity, and automatic dumping of molasses into weighing final weighing scale. The present system of weighing in a Howe scale is not applicable when rate of production of molasses is high, because all pumps have to be used to take molasses out of the factory, leaving no pump for transferring molasses to the Howe scale.
Richmond/Llandoverly	41"	1	22 40	12 RM 22" $\times$ 42 $\frac{1}{2}$ ", 6 RM 24" $\times$ 42"	18	H.P. of knife engine increased from 40 to 90 for 1960 crop.
Jamacia Sugar Estates ..	60"	2	30/30 90/160	2-3 RC 30" $\times$ 60", 12 RM 30" $\times$ 60"	16	Rotary filter and additional tray on clarifier installed and used during 1959 crop. For 1960 crop: one 600 kW. Turbo-Alternator, two 1,200 sq. ft. juice heaters, three Thomson Eisner F.D. furnaces, one Kemcoitt Thompson water treatment plant, one tramp iron magnet and reheat coils in pug mill for C Mascuete.
Frome	78"	2	38/38 300/200	3 RC 36 $\frac{1}{2}$ " $\times$ 78", 19 RM 36" $\times$ 78"	15	For 1960 crop: two crane gantry for cane handling, extended carrier hoses to accommodate second cane carriers and knives, etc, fifteen roller 35" $\times$ 78" milling plant complete, three B. & W. 6300 H.S., W.I.F. type boilers complete with bagasse carriers, etc, Foxboro juice weighing equipment, one 8' $\times$ 9' Oliver filter, one 1,600 sq. ft. H.S. juice heater, two 7,500 sq. ft. H.S. evaporator vessels, two 1,000 cu. ft. vacuum pans, one seed receiver, nine 42" $\times$ 24" Broadbent centrifugals, one fan cooling tower, one 1,000 H.P. turbo alternator, one 265 kW. diesel alternator and two 2,000 gal. calandrias pot stills.
New Yarmouth ..	52"	2	26/36 150/140	3 RC 28 $\frac{1}{2}$ " $\times$ 54", 12 RM 26" $\times$ 54"	15	No change.
Caymanas	48"	1	32 110	3 RC 27" $\times$ 48", 12 RM 25" $\times$ 48"	15	New equipment installed and used during 1959 crop: one 750 h.p. Wear turbine to replace 30" $\times$ 60" Corliss engine. For 1960 crop: new 750 sq. ft. H.S. vacuum pan and new 12" $\times$ 24" dry air pump.
Innswood	42"	2	24/24 75/100	3 RC 24" $\times$ 42", 12 RM 24" $\times$ 42"	15	For 1959 crop a new bag closing machine was installed.
Barnett	40"	2	24/28 75/120	3 RC 23" $\times$ 38", 12 RM 22" $\times$ 38"	15	For 1960 crop: converting one natural cooled crystallizer to water cooled.
Worthy Park ..	42"	1	24 45	3 RC 22 $\frac{1}{2}$ " $\times$ 42", 3 RM 22 $\frac{1}{2}$ " $\times$ 42", 9 RM 24" $\times$ 42"	15	For 1960 crop: filter press filtering area increased from 980 to 1,160 sq. ft.
Ree Hall	38"	1	26 75	15 RM 24" $\times$ 42"	15	For 1960 crop: two locally made calandrias for two 1,500 gal. pot stills.

TABLE I—continued

Factories	Width Carrier	Knives			Crushers and Mills	Total Rolls	Remarks
		Setts	Blades/Sett	H.P.			
Gray's Inn Central ..	60"	1	10	20	2 RC 36" × 60", 12 RM 30" × 60"	14	New equipment used 1959 crop: W.T. boiler, 750 kW. B.T.H. turbo alternator, 90 kW. diesel generator, Mason-Neulan level control evaporator, all steel slat Renold chain cane carrier, additional 6-ton gantry crane and 20-ton Dennison weighbridge, U.W.S. boiler feed, treatment plant, and Lea V-notch recorder for imbibition. For 1960 crop: one W.T. boiler, full electronic control evaporator, 120 kW. diesel generator, 80 kW. diesel generator. Hydrostatic contents gauges were installed for 1959 crop.
Sevens ..	54"	1	26	200	12 RM 32" × 60"	12	New equipment installed during 1959 crop: 20,000 gal. storage tank for condensate and oil-firing equipment installed in four boilers. For 1960 crop: Edwards hydraulic accumulators on first and second mills. Bagasse storage shed and automatic control valve for boiler fans. Replace coils in stills with calandrias. Replace twelve wooden fermenting tanks by six steel tanks.
Bybrook ..	39"	1	24	75	3 RM 26½" × 42", 3 RM 25½" × 42", 6 RM 24" × 42"	12	For 1959 crop: installed and used turbine drive for Nos. 1 and 2 mills. Centrifugal pumps for high grade molasses and magma. Two multijet condensers for Nos. 1 and 2 vacuum pans. Manually operated plough for one low grade centrifugal basket (expi.). For 1960 crop: one complete Savalle W.T., two continuous stills with rectifier, boiling and stripping columns of 1,800 gal., run 124-hour capacity.
Serge Island ..	48"	1	22	220	3 RC 36" × 48", 9 RM 24" × 48"	12	Installed and used during 1959 crop: 60 tons/hour Maxwell Boulogne juice scale, 2,600 sq. ft. H.S. quad. Two 760 sq. ft. H.S. juice heaters. Hydrated line now being used. For 1960 crop: installation of Derrick type cane crane. Cane feeder carrier (additional) being built at site. New first motion gearing to speed up mills.
Vale Royal ..	42"	1	30	75	12 RM 24" × 42"	12	No change.
Appleton ..	43"	1	52	125	3 RC 36" × 42", 9 RM 25" × 42"	12	New steam turbine for milling plant and for No. 2 knives ordered for 1960 crop.
Hamptden ..	44"	2	20/16	50/100	12 RM 24" × 48"	12	For 1959 crop: installed 1,600-gal. dist. still. New building. For 1960 crop: new turbine for power house 300 kW. generator. Electrification of injection water pump drive, and installation of auxiliary oil-firing equipment.
Bernard Lodge ..	87"	2	42/42	180/100	2 RC 34" × 87", 3 RM 39" × 84", 6 RM 38" × 84"	11	For 1959 crop: 1,900 h.p. Murray steam turbine for driving mill. First and second mill equipped with Edwards hydraulics. Centrifugals for C Masscouite equipped with changing cones and mechanical ploughs.
Holland ..	36"	1	18	40	2 RC 21" × 36", 9 RM 22" × 36"	11	No change.
Long Pond ..	43"	1	33	60	9 RM 24½" × 48"	9	For 1960 crop: boilers to be rearranged. Nos. 1 and 2 to be coupled and H.S. increased 8464. Existing steam engine to be demolished and replaced by a film cooling tower. An extra evaporator of 4,600 sq. ft. H.S. will be installed as first vessel of existing quad.

TABLE II

FACTORY STATIONS CAPACITIES—1959 CROP

	Mon- musk	Rich- mond/ Llan- dover	Jamaica Sugar Estate	Frome	New Yar- mouth	Cay- manas	Inns- wood	Bar- nett	Worthy Park	Rose Hall	Gray's Inn Central	Sevens	By- brook	Serge Island	Vale Royal	Apple- ton	Hamp- den	Ber- nard Lodge	Holland	Long Fond
Per Ton Cane per Hour:																				
Boilers																				
As Water Tube	268	265	385	212	316	346	299	309	284	293	309	338	272	289	280	379	273	259	495	279
Superheater	43	—	60	34	41	—	—	26	—	—	14	—	—	—	—	37	—	27	—	—
Juice Heaters	29	29	23	31	25	30	36	37	37	39	28	29	38	34	39	34	16	29	43	46
Filters	—	42	—	—	—	4-65	3-33	4-87	25	5-50	6-34	3-16	3-26	6-88	5-54	—	—	—	67	54
Rotary	3-63	—	4-94	3-78	4-71	—	—	—	—	—	—	—	—	—	—	—	—	4-90	—	—
First Subsiders																				
Continuous	44	77	77	77	99	86	60	97	53	73	71	51	62	121	97	63	69	82	110	91
Intermittent	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Second Subsiders																				
Intermittent	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23	—
Evaporators																				
As H.S.	9-69	12-79	7-05	8-89	9-63	—	12-12	11-37	11-94	13-32	—	—	4-99	13-38	9-33	10-40	—	—	—	21-34
As Quad	189	227	233	196	212	314	211	172	204*	338	241	218	164	195	184	231*	237	237	269	194
Per Ton Commercial																				
Sugar per Hour:																				
Exporters																				
As Quad	2,173	2,365	2,419	1,966	2,064	3,188	2,034	1,587	1,719	2,321	2,789	2,143	1,477	1,710	1,919	2,137	2,521	2,450	2,825	2,131
Vacuum Pans																				
As Calandria	584	211	595	408	489	472	478	488	346	—	750	344	378	238	461	488	452	616	424	621
cu. ft.	417	304	374	283	343	288	328	401	297	313	481	256	226	149	294	—	268	337	454	434
Syrup Tanks																				
cu. ft.	217	160	225	140	220	246	128	175	119	123	315	118	151	236	173	178	186	373	277	271
A and B Molasses Tanks																				
cu. ft.	576	364	450	336	309	246	439	364	424	367	766	332	305	435	340	500	260	560	734	424
Crystallizers																				
Natural Cooling	—	—	517	—	257	—	485	973	368	408	481	—	235	404	—	508	228	700	534	—
Air Cooled (Pit.)	554	460	862	309	468	491	503	404	—	544	1,138	646	470	336	1,228	445	489	—	847	1,172
Water Cooled	204	200	131	115	61	—	15	—	—	216	334	—	235	101	—	—	267	—	—	—
sq. ft. C.A.																				
Total Installed:																				
Pug Mill L.G. Sugars																				
Water Heated	574	75	149	—	550	—	102	80	—	—	84	67	58	90	—	2,600	—	—	—	320
Vapour Heated	—	—	—	—	—	—	15	—	55	—	—	14	118	—	—	—	—	—	—	—
sq. ft.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Centrifugals:																				
High Grade Sugars No. Off.	8	6	6	9-4	4	8	3	6	5	4	6	6	6	6	7	3	3	8	3	3
Size: Height	20	18	20	20	24	18	24	18	18	18	18	18	18	18	14	24	24	24	18	20
ins.	42	42	42	42	40	36	42	30	36	36	36	36	36	36	30	30	42	40	30	42
Diameter	1,200	1,200	1,000	1,000	50-850-	1,000	1,200	1,100	1,200	1,100	1,220	1,200	1,300	1,000	1,200	1,200	1,200	1,100	1,200	1,200
Operating Speed	860	615	595	595	510	510	860	515	735	620	760	735	720	510	615	1,000	860	685	615	860
Gravity Factor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Low Grade Sugars No. Off.																				
Size: Height	12	6	8	13	4	4	3	6	2-1	5	7	6	4	3	5	5	3	4	2	2
ins.	20	18	20	20	24	18	24	18	18-18	18	18	18	18	20	18	24	24	24	18	20
Diameter	42	30	42	42	40	42	42	30	30-36	30	36	36	36	42	30	40	40	42	30	42
Operating Speed	1,200	1,200	1,000	1,000	1,650	1,300	1,300	1,100	1,200	1,200	1,140	1,200	1,200	1,000	1,200	1,000	1,900	1,400	1,200	1,200
Gravity Factor	860	615	595	595	1,520	1,005	1,010	515	615-735	615	685	735	735	595	615	565	1,840	1,170	615	860
Attenuation																				
No. Off.	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Size: Height	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ins.	42	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Diameter	1,200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Operating Speed	860	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gravity Factor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Refinery																				
No. Off.	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Size: Height	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ins.	42	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Diameter	1,200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Operating Speed	860	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gravity Factor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

* Quintuple.

TABLE III
FACTORY QUANTITIES—1959 CROP

	Monv- musk	Rich- mond Llan- dover	Jamaica Sugar Estate	Frome	New Var- mouth	Cay- manas	Inns- wood	Bar- nett	Worthy Park	Rose Hall	Gray's Inn Central	Sevens	By- brook	Serge Island	Vale Royal	Apple- ton	Hamp- den	Ben- nard Lodge	Holland	Long Ford	Totals and Averages
Tons Cane:																					
Estate Ground ..	464,828	56,067	122,969	402,564	43,168	114,260	80,936	32,742	30,168	32,366	60,490	93,075	87,255	59,038	67,407	85,885	70,600	116,480	42,255	46,321	2,129,464
Purchased Ground ..	120,180	2,300	72,172	443,110	202,689	13,410	70,756	47,742	59,963	27,148	79,790	120,988	65,171	57,299	38,850	60,580	100,018	70,926	8,576	29,792	1,691,060
Total Ground ..	585,018	58,467	195,141	845,674	245,797	127,670	151,692	80,484	110,131	60,114	140,280	214,033	152,426	116,337	106,257	146,465	170,618	187,006	50,811	76,113	3,820,524
Total for Sugar Manuf. ..	584,733	58,435	195,141	845,367	245,797	127,670	151,692	80,484	110,131	60,114	140,280	214,033	152,426	116,337	106,207	140,171	159,315	186,990	50,811	76,113	3,796,524
Grd. for Other Purposes ..	295	—	—	307	—	—	—	—	—	—	—	—	—	—	50	46,294	11,503	16	—	5,935	24,200
Bagasse:																					
Estimated Surplus ..	—	—	2,000	1,800	190	—	278	—	—	—	—	50	—	—	10	—	—	—	—	—	4,288
Fuel:																					
Wood used: Factory ..	160	800	—	45	100	850	260	4,758	—	2,300	225	630	10	550	640	200	962	—	2,433	3,300	20,888
Distillery ..	—	—	—	—	—	—	—	—	—	—	215	—	—	—	—	—	1,900	—	—	1,000	—
Locomotives ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lime Kiln ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Oil: Distillery .. Gal.	—	—	—	—	—	—	—	—	—	—	—	75,600	—	—	—	—	—	133,500	—	—	389,453
Factory: Wood Ton 98 ⁵	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sugar .. Tons	0-003	0-136	—	—	0-004	0-066	0-016	—	—	—	0-018	0-029	—	0-040	0-062	0-012	0-058	—	—	0-507	—
Filter Cake	18,898	1,077	4,014	19,671	7,157	3,555	3,554	2,689	1,719	1,081	3,866	6,384	4,433	2,950	2,714	5,282	4,247	5,762	680	817	98,552
Molasses:																					
Equivalent 88° Brix .. Gal.	3,895,609	320,910	1,119,609	4,766,549	1,391,178	\$25,911	809,372	414,602	485,796	341,253	818,410	1,416,175	846,536	614,645	363,579	745,983	962,811	979,677	254,909	340,670	21,914,257
Sugar Made:																					
"A" Grade .. Tons	—	—	—	—	—	—	—	—	—	—	—	—	201-30	—	—	—	—	—	—	—	201-30
"C" Grade .. "	—	—	—	—	—	3,001-00	—	800-00	2,300-00	—	530-00	—	3,500-00	—	—	—	—	—	—	—	10151-00
"D" Grade .. "	—	1043-00	—	5,000-00	843-00	3,000-20	1171-40	1800-00	2,500-00	—	3,500-00	868-60	4172-50	—	1200-00	6300-00	650-00	3,309-00	—	350-00	35807-70
Refined .. "	13840-00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13840-00
Total Local Consumption, ..	13840-00	1043-00	—	5,000-00	843-00	6,001-20	1171-40	2,700-00	4,800-00	—	4,030-00	868-60	7873-80	—	1300-00	6300-00	650-00	3,309-00	—	350-00	6000-00
Export .. "	37107-90	4802-70	18756-30	79160-00	24427-20	6576-00	14549-90	6018-60	8301-20	6182-30	8188-30	20878-30	9043-00	13271-30	8975-70	9521-50	15381-00	16311-50	4840-30	6030-40	318255-60
Official Crop Production	50947-90	5846-70	18756-30	84160-00	25270-20	12577-20	15721-30	8718-60	13101-20	6182-30	12158-70	21746-30	16918-80	13271-30	10175-70	15821-50	16031-00	19620-50	4840-30	6280-40	378225-60
Lime, Burnt .. Tons	1,961,268	106,400	205,069	944,759	326,278	192,640	176,579	95,424	141,120	55,293	128,980	236,800	136,500	132,009	100,800	236,725	108,373	285,630	67,144	123,200	5,761,671
Phosphate .. "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Superphosphate .. "	—	3,360	—	—	—	—	—	—	15,008	—	—	—	—	—	—	—	—	—	—	—	18,36
Tri-Sodium Phosphate .. Lbs.	17,696	—	—	28,528	—	669	—	—	—	—	—	—	—	—	—	—	—	—	—	—	46,89

Remarks: Monymusk: * Estate canes actually ground. Estate canes actually reaped amounted to 470,877 tons.
Appleton: † Includes canes used for sugar sacrificed for rum production.
Caymanas: ‡ Furnace.

TABLE IV
FACTORY ANALYTICAL DATA—1959 CROP

	Mony- musk	Rich- Llan- dover	Jamaica Sugar Estates	Frome	New Year- month	Cay- manas	Inns- wood	Bar- nett	Worthy Park	Rose Hall	Gray's Inn Central	Sevens	By- brook	Serge Island	Vale Royal	Apple- ton	Hamp- den	Ber- nard Lodge	Holland	Long Pond	Averages
Cane																					
Pol % ..	10.68	11.48	11.25	11.37	12.11	11.53	11.97	12.65	13.02	13.07	10.30	12.13	12.73	12.93	11.29	13.14	11.91	12.55	12.14	10.84	11.76
Fibre % ..	13.32	14.20	14.79	14.18	14.79	14.17	13.26	13.72	13.49	14.02	15.93	12.93	13.04	14.72	14.84	13.79	13.74	16.42	13.96	15.12	14.20
Bagasse																					
Pol % ..	2.14	1.81	2.70	2.23	2.56	2.06	2.74	2.78	2.81	2.60	1.95	3.04	2.82	2.48	2.57	2.81	2.66	2.85	3.37	3.10	2.48
Moisture % ..	51.82	45.98	44.38	48.55	47.79	47.80	48.77	46.97	45.62	47.57	47.45	50.10	46.02	45.33	46.35	46.19	49.64	48.81	46.01	46.39	48.31
Juices																					
First Exp. °Brix	17.12	17.97	17.34	17.62	18.53	17.84	18.37	18.72	19.84	18.78	17.26	18.66	18.55	19.28	17.34	19.10	17.88	19.59	18.29	16.53	18.01
Pol %	13.89	14.64	14.16	14.32	15.26	14.84	15.15	15.92	17.31	15.46	13.96	15.23	15.65	16.47	14.86	16.57	15.19	16.13	15.03	13.72	14.78
App. Purity	78.19	83.32	81.66	81.27	82.35	83.20	82.47	85.04	87.25	82.32	80.89	81.64	84.37	85.42	82.81	86.75	84.96	82.34	82.18	83.00	82.06
Absolute °Brix	16.17	16.45	16.66	16.69	17.67	16.42	17.17	17.52	18.94	17.60	15.71	17.64	17.70	18.07	16.37	18.02	16.72	18.72	15.79	17.01	17.01
App. Purity	76.21	81.34	79.24	79.33	80.47	81.79	80.35	83.05	84.95	80.34	77.95	79.25	82.60	83.90	80.97	84.57	82.72	80.21	80.04	80.87	80.10
Mixed °Brix	15.49	14.45	14.90	15.16	15.62	14.94	15.20	15.70	16.34	15.44	14.53	15.42	15.45	16.20	14.38	15.24	14.19	16.46	15.59	13.71	15.27
App. Purity	76.56	81.59	79.74	79.82	80.81	82.07	80.71	83.38	85.25	80.63	78.50	79.70	82.93	84.28	81.34	84.91	83.09	80.56	80.18	81.25	80.50
R.S. Pol Ratio	10.72	8.42	11.36	12.73	8.67	7.84	8.56	6.09	5.93	6.47	9.04	9.93	8.19	7.35	9.34	7.40	—	5.56	9.30	10.24	9.63
Last Exp. °Brix	4.79	2.94	5.89	4.69	3.62	3.86	4.68	5.70	4.02	5.20	4.97	5.79	4.44	7.05	4.83	4.44	4.23	6.98	9.57	6.79	—
App. Purity	70.63	75.86	73.01	72.28	75.70	77.19	76.07	78.64	80.35	73.62	70.39	74.38	76.84	77.50	76.15	79.73	77.47	76.36	77.35	77.06	—
Evaporator Supply																					
°Brix	15.51	14.73	14.33	15.38	15.25	14.34	14.96	16.81	16.28	15.68	14.72	15.86	15.37	17.22	14.23	15.68	13.77	16.41	15.38	13.70	—
App. Purity	77.63	81.81	80.46	80.36	81.64	81.42	81.35	83.78	85.99	81.39	79.09	80.64	83.38	85.05	82.08	85.78	82.47	81.47	79.59	81.90	—
°Brix	55.87	66.92	61.31	60.04	61.20	63.11	59.07	58.14	58.84	63.38	61.05	67.08	86.02	61.25	60.20	60.46	65.31	62.33	61.01	54.24	—
App. Purity	77.94	82.30	81.10	81.03	81.10	81.44	81.95	84.43	86.95	82.16	80.05	81.45	84.11	85.26	82.83	86.43	83.91	82.35	80.89	83.19	—
Filter Cake Pol %	2.07	4.29	1.46	1.12	2.65	1.53	1.76	1.96	4.75	1.88	2.49	1.51	1.93	2.02	3.64	1.70	3.10	1.78	5.42	4.74	2.02
Moisture %	78.42	71.96	—	77.06	76.77	69.64	77.48	76.62	53.02	74.38	69.16	73.01	77.50	77.07	65.50	77.23	74.19	72.78	61.28	—	75.18
Sugars																					
(Export) Pol %	96.75	—	—	96.51	97.40	97.44	96.44	97.32	96.62	97.02	97.00	96.55	97.13	97.79	—	97.65	97.84	97.02	96.58	97.40	—
(All) Pol %	97.63	96.49	97.14	96.50	97.46	97.63	96.44	97.35	96.85	97.02	96.70	96.64	97.13	97.79	97.14	97.03	97.83	96.96	96.58	97.40	97.04
(Export) Moisture %	0.77	—	—	0.83	0.75	0.84	0.90	0.73	0.90	0.92	0.83	0.81	0.77	0.65	—	0.78	0.76	0.98	0.90	0.64	—
(All) Moisture %	0.56	0.93	0.86	0.83	0.74	0.84	0.90	0.70	0.83	0.82	—	0.81	0.76	0.65	0.68	0.84	0.76	0.98	0.90	0.64	0.78
Final Molasses																					
°Brix	93.31	87.09	87.46	90.70	90.53	90.30	90.14	88.53	88.44	88.89	89.94	90.03	88.51	86.85	87.98	86.55	88.48	92.01	84.66	86.92	89.87
App. Purity	34.49	33.78	30.46	31.16	33.69	32.66	31.59	31.51	32.23	30.70	31.66	30.25	31.74	31.41	30.64	31.53	30.68	35.71	38.94	31.21	32.36

TABLE V

FACTORY CONTROL DATA—1959 CROP

Control Classification	Rich- mond/ Llan- dover	Jamaica Estate	Frome	New Yar- mouth	Cay- manas	Inns- wood	Bar- nett	Worthy Park	Rose Hall	Gray's Inn Central	Sevens	By- brook	Serge Island	Vale Royal	Apple- ton	Hamp- den	Ber- nard Lodge	Holland	Long Ford	Averages
Cane																				
Fibre/Pol Ratio	1.25	1.31	1.25	1.22	1.23	1.11	1.09	0.97	1.21	1.55	1.06	1.03	1.14	1.31	1.05	1.15	1.31	1.15	1.39	1.21
Tons Cane/Ton 96° Sugar	11.21	10.23	9.93	9.52	9.90	9.58	9.06	8.30	9.58	11.44	9.77	8.87	8.55	10.27	8.53*	9.63	9.39	10.40	10.79	9.89
Demerara Index	21.89	21.48	21.35	21.63	21.43	21.65	21.61	22.22	21.65	21.74	21.95	21.59	21.48	21.66	21.67	21.59	21.94	22.54	21.63	21.65
Java Ratio	79.76	79.45	79.40	79.36	77.70	79.01	78.83	80.42	78.07	73.78	79.97	81.28	78.51	78.62	79.30	78.41	77.81	80.77	79.01	79.57
Milling																				
Tons Cane/Hour	165.15	70.90	178.90	63.63	46.46	45.01	30.78	37.68	27.26	52.83	68.35	46.07	43.60	36.28	47.14	57.70	81.66	18.56	28.12	64.46
Tons Fibre/Hour	21.99	10.49	26.37	9.42	6.58	6.97	4.22	5.08	3.98	8.41	8.83	6.01	6.42	5.38	6.50	7.93	13.41	2.59	4.25	9.15
Imbibition % Cane	14.27	16.69	17.81	20.67	17.69	19.20	17.75	21.07	20.41	16.81	20.31	19.39	18.06	19.53	22.99	23.86	21.78	17.66	19.34	18.62
Imbibition % Fibre	107.12	112.87	125.59	139.71	124.93	144.73	129.40	156.17	139.63	105.56	157.06	148.78	122.64	131.64	166.71	173.39	132.70	126.48	127.91	131.14
Pol Extraction	94.09	95.66	94.24	93.60	94.81	93.64	93.85	94.63	93.56	93.93	92.96	94.26	94.51	93.28	94.14	93.46	92.15	92.18	91.38	93.80
Reduced Pol Extraction	94.51	96.24	94.73	95.51	94.06	94.47	95.08	94.63	94.63	95.42	93.23	94.53	95.46	94.49	94.75	94.15	94.29	93.11	93.01	94.65
Absolute Juice Lost % Fibre	38.46	26.22	39.41	34.86	36.87	31.43	41.60	38.68	34.44	37.61	32.03	47.41	38.23	31.81	38.36	40.98	39.96	48.20	48.95	37.46
Bagasse % Cane	29.50	27.49	29.33	30.29	28.56	27.85	27.71	26.53	29.89	32.01	28.22	25.90	28.60	29.51	28.60	31.49	34.59	28.13	30.49	29.37
Time Grinding % Gross G.T.	70.89	64.58	83.56	81.24	69.55	63.65	80.84	60.58	74.88	77.01	72.94	82.66	73.00	76.86	75.58	74.27	78.78	67.99	81.32	72.44
Purity Drop																				
First Expresed—Mixed	1.63	1.92	1.45	1.54	1.13	1.76	1.66	2.00	1.49	2.39	1.94	1.39	1.14	1.47	1.84	1.87	1.78	2.00	1.75	1.56
First Expresed—Last Expresed	7.56	8.65	8.99	6.65	6.01	6.40	6.40	6.90	8.70	10.50	7.26	7.53	7.92	6.66	7.02	7.49	5.98	4.83	5.94	—
Boiling House																				
Tons Brix/Hour	21.67	9.32	24.01	8.93	6.19	6.25	4.35	5.82	3.81	6.51	9.71	6.65	6.32	4.69	6.87	7.73	11.72	2.59	3.42	8.83
Tons 96° Sugar/Hour	14.72	6.93	17.92	6.69	4.67	4.70	3.40	4.54	2.84	4.62	6.99	5.20	5.10	3.53	5.18	5.57	8.71	1.78	2.61	6.52
Filler Cake % Cane	3.23	2.06	2.33	2.91	2.78	2.84	3.34	1.56	1.80	2.76	2.98	2.91	2.53	2.55	2.34	2.67	3.08	1.54	1.16	2.60
Gallons Final Molasses at 88° Brix/Ton 96° Sugar	74.69	58.72	56.25	53.88	64.03	51.10	46.65	36.46	54.40	66.72	64.66	49.23	45.20	54.72	43.01	58.49	49.17	53.18	52.38	56.68
Efficiency (W.C.)	96.44	96.56	99.78	97.64	96.55	98.74	97.30	93.99	97.59	97.14	96.49	97.96	98.66	97.37	97.65*	96.16	97.37	91.23	98.57	97.09
Purity Rise: Mixed—Syrup	0.68	1.36	1.21	0.29	—	1.34	1.05	1.70	1.33	1.55	1.75	1.13	0.98	1.49	1.52	0.82	1.79	0.71	0.94	—
Pol Balance (in Cane)																				
% in Sugars	See	84.04	84.53	82.72	83.54	83.62	84.02	82.79	82.64	81.26	80.56	84.78	86.27	82.44	See	82.22	81.06	75.80	81.68	82.26
% in Molasses	Note	9.29	8.91	9.08	9.61	8.13	7.44	6.44	8.29	10.44	9.45	8.04	7.29	8.32	Note	8.84	8.63	9.13	8.04	9.05
% in Filler Cake	below	0.69	0.22	0.64	0.37	0.34	0.52	0.53	0.28	0.66	0.37	0.44	0.40	0.82	below	0.68	0.44	0.60	0.51	0.44
% in Bagasse	4.34	6.83	5.76	6.40	5.19	6.36	6.15	5.37	6.44	6.07	7.04	5.74	5.49	6.72	6.58	6.58	7.85	7.82	8.72	6.20
% Undetermined	1.64	0.92	0.58	1.16	1.29	1.55	1.87	4.87	2.85	1.58	2.58	1.00	0.55	1.70	1.68	2.02	6.65	6.65	1.05	2.05

Monymusk's Pol Balance to read:—
 % in Sugars .. 79.63
 % in Molasses .. 12.00
 % in Filler Cake .. 0.61
 % in Bagasse .. 5.91
 Undetermined .. 1.21

Refinery:—In Filler Cake .. 0.01
 In Molasses .. 0.41
 Undetermined .. 0.22

Appleton's Pol Balance to read:—
 % in Sugars .. 79.95
 % in Molasses .. 5.55
 % in Filler Cake .. 0.29
 % in Bagasse .. 5.86
 Undetermined .. 1.35

In Clarified and Cloudy Juice
 A and B Molasses ..
 In Syrup ..
 Undetermined ..

* Corrected for materials sent to the Distillery.

TABLE VI
NON-FACTORY STOPPAGES AND TIME GRINDING % GROSS GRINDING TIME—1959 CROP
(as reported by the Factories)

Factories	Field stoppages	Transportation	Pre-meditated	Rain	Labour	End of run	Nett grinding time	Time grinding
Monymusk	3.97	0.20	5.32	3.07	11.99	3.70	71.75	70.89
Richmond/Llandovery ..	5.76	—	2.66	—	1.03	10.00	80.55	67.50
Jamaica Sugar Estates ..	6.08	0.01	—	0.78	18.43	6.19	68.51	64.58
Frome	0.14	0.06	3.32	0.10	4.83	2.47	89.08	83.56
New Yarmouth	2.06	—	3.47	1.56	—	7.26	85.65	81.24
Caymanas	5.13	—	3.03	1.82	10.47	5.51	74.04	69.55
Innswood	5.75	—	4.45	—	13.29	7.10	69.41	63.65
Barnett	5.65	—	2.36	—	—	6.60	85.39	80.84
Worthy Park	1.02	—	—	—	29.40	3.90	64.78	60.58
Rose Hall	2.45	3.64	2.69	1.14	0.12	10.22	79.73	74.88
Gray's Inn Central ..	5.78	—	4.84	—	—	11.76	77.62	77.01
Sevens	8.84	—	5.58	0.06	—	4.35	81.17	72.94
Bybrook	6.01	—	0.73	—	—	6.21	87.05	82.66
Serge Island	4.24	0.13	—	—	11.68	7.17	76.78	73.00
Vale Royal	4.88	—	2.55	0.12	—	6.90	85.55	76.86
Appleton	1.91	—	11.76	0.44	2.00	—	83.89	75.58
Hampden	8.54	—	5.68	0.54	—	4.38	80.86	74.27
Bernard Lodge	4.73	0.09	1.32	1.02	—	6.20	86.64	78.78
Holland	4.77	—	2.08	0.09	—	10.54	82.52	67.99
Long Pond	0.68	—	3.35	—	—	5.42	90.55	81.32
Island Averages ..	4.40	0.16	3.32	0.56	5.92	6.03	79.61	72.44

NOTE. Gross Grinding Time = Interval between commencement and termination of milling.
 Nett Grinding Time = Possible Grinding Time.
 Time Grinding = Actual Grinding Time.

TABLE VII
FACTORY STOPPAGES AND TIME GRINDING % NETT GRINDING TIME

Factories	Mechanical	Electrical	Chokes	Juice room	Steam	Other reasons	Time grinding
Monymusk	1.13	0.02	0.01	0.03	0.01	—	98.80
Richmond/Llandovery ..	10.51	0.36	0.27	3.59	0.91	0.53	83.83
Jamaica Sugar Estates ..	3.41	0.36	0.23	—	2.37	2.70	90.93
Frome	5.11	0.06	0.33	—	0.22	0.47	93.81
New Yarmouth	3.54	0.24	0.46	0.04	0.07	0.80	94.85
Caymanas	3.58	0.30	0.29	1.63	0.18	—	94.02
Innswood	6.49	0.19	0.64	0.19	0.42	0.36	91.71
Barnett	4.49	—	0.62	1.38	0.60	1.72	91.19
Worthy Park	7.45	0.11	0.27	0.80	0.45	0.51	90.41
Rose Hall	7.91	0.12	0.35	0.15	1.64	—	89.83
Gray's Inn Central ..	0.94	0.49	1.09	0.61	0.14	1.10	95.63
Sevens	7.82	0.21	2.50	0.84	0.56	1.04	87.03
Bybrook	5.75	0.09	1.20	0.07	0.14	0.58	92.17
Serge Island	4.54	0.61	0.56	0.61	0.09	1.96	91.63
Vale Royal	6.82	2.62	0.71	0.85	0.43	1.69	86.88
Appleton	8.05	0.12	1.09	0.49	0.03	0.14	90.08
Hampden	6.95	—	0.78	1.81	1.35	0.28	88.83
Bernard Lodge	5.14	2.62	0.15	0.32	0.82	0.14	90.91
Holland	10.17	0.12	0.56	3.58	2.56	0.62	82.39
Long Pond	6.44	1.20	0.35	0.54	0.08	1.58	89.81
Island Averages ..	5.74	0.45	0.63	0.80	0.61	0.78	90.99

SUMMARY

Time Grinding	59121.69 Hours	
Factory Stoppages	5853.29 ..	= 7.17% Gross Grinding Time.
Nett Grinding Time	64974.98 ..	
Non-Factory Stoppages	16643.50 ..	= 20.39% Gross Grinding Time.
Gross Grinding Time	81618.48 Hours	

PART 3 DISTILLERY DATA—1959 CROP

TABLE I DISTILLERY CAPACITIES

	Mon- musk	Rich- mond/ dovey	Jamaica Sugar Estate	Fronte	New Yar- mouth	Cay- manas	Inns- wood	Bar- nett	Worthy Park	Rose Hall	Gray's Inn Central	Sevens	By- brook	Serge Island	Vale Royal	Apple- ton	Hamp- den	Ber- nard Lodge	Holland	Long Pond	Totals
Fermentation																					
No. off	30	40	9	42	37	15	15	17	10	13	9	24	15	10	20	32	26	44	14	90	532
Total Capacity	362,000	50,900	125,000	171,800	61,500	75,000	120,000	36,000	20,000	56,000	90,000	42,405	42,600	70,000	34,230	82,800	58,000	132,000	12,000	174,180	1,728,313
Dumler Boxes	4	10	6	7	5	2	4	10	5	11	—	—	4	3	—	8	5	12	3	13	—
Total Capacity	12,000	20,000	65,000	19,600	5,500	42,400	10,000	5,000	9,000	13,200	—	—	7,000	10,000	8,900	—	10,000	36,000	2,500	12,000	288,000
Cooling Surface	sq. ft.	—	150	—	—	—	—	—	—	—	—	—	—	—	—	—	840	—	—	—	990
Distillation																					
Wash Preheater	No. 1																				
Capacity	gal.	1,500	—	3,800	4,000	3,000	—	Tubular	1,500	—	Cont.	3,417	1,300	—	850	300	—	3,000	—	—	23,867
Capacity	No. 2	831	—	166	—	100	—	—	—	—	330	51	60	—	40	—	360	—	—	—	1,963
Capacity	No. 2	135	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3,700
Capacity	sq. ft. H.S.	588	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	720
Capacity	sq. ft. C.S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Still No. 1																					
Loading Capacity	gal.	1,300	2,500	1,900	1,500	1,500	2,500	1,800	1,300	1,500	—	1,780	1,237	1,500	1,500	1,500	2,000	1,380	1,000	1,200	30,387
L.W. retort charges	gal.	135	104	120	130	300	105	200	165	180	—	230	250	200	80	108	250	112	120	120	1,889
L.W. retort charges	sq. ft. H.S.	280	350	150	240	175	300	220	150	180	—	230	400	140	100	160	300	168	120	120	1,889
H.W. retort charges	gal.	200	240	120	150	150	350	180	120	120	—	190	130	140	64	150	200	140	100	100	11,880
H.W. retort charges	sq. ft. H.S.	200	240	120	150	150	350	180	120	120	—	190	130	140	64	150	200	140	100	100	2,884
Condenser	sq. ft. C.S.	2,660	766	—	—	—	—	470	—	—	—	355	752	185	—	—	—	—	—	—	5,188
Still No. 2																					
Loading Capacity	gal.	1,500	2,500	2,000	1,500	1,500	—	—	—	1,500	—	1,780	1,237	1,500	1,500	1,400	1,500	1,380	1,000	800	25,537
L.W. retort charges	gal.	135	104	120	130	300	105	200	165	180	—	230	250	200	80	108	250	112	120	120	2,993
L.W. retort charges	sq. ft. H.S.	250	350	150	240	175	300	220	150	180	—	230	400	140	100	160	300	168	100	100	3,003
H.W. retort charges	gal.	200	240	120	150	150	350	180	120	120	—	190	130	140	64	150	200	140	80	80	11,880
H.W. retort charges	sq. ft. H.S.	200	240	120	150	150	350	180	120	120	—	190	130	140	64	150	200	140	80	80	9,394
Condenser	sq. ft. C.S.	1,916	766	—	—	—	—	—	—	—	—	351	752	400	—	—	—	—	—	—	4,005
Still No. 3																					
Loading Capacity	gal.	2,000	2,500	1,800	1,200	1,500	—	—	—	—	—	—	—	—	—	1,400	1,500	1,380	1,500	1,500	13,980
L.W. retort charges	gal.	185	104	86	300	185	—	—	—	—	—	—	—	—	—	108	1,000	1,112	1,500	1,500	845
L.W. retort charges	sq. ft. H.S.	250	350	240	140	175	—	—	—	—	—	—	—	—	—	160	200	168	150	150	1,658
H.W. retort charges	gal.	200	240	120	150	150	—	—	—	—	—	—	—	—	—	140	150	140	180	180	4,200
H.W. retort charges	sq. ft. H.S.	200	240	120	150	150	—	—	—	—	—	—	—	—	—	140	150	140	180	180	1,890
Condenser	sq. ft. C.S.	—	766	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	766
Still No. 4																					
Loading Capacity	gal.	2,000	—	1,800	1,500	1,500	—	—	—	—	—	—	—	—	—	1,200	1,000	1,500	—	—	9,000
L.W. retort charges	gal.	185	—	88	300	185	—	—	—	—	—	—	—	—	—	65	135	150	180	180	713
L.W. retort charges	sq. ft. H.S.	250	—	240	140	175	—	—	—	—	—	—	—	—	—	130	150	150	180	180	1,150
H.W. retort charges	gal.	200	—	220	120	150	—	—	—	—	—	—	—	—	—	130	80	150	—	—	930
H.W. retort charges	sq. ft. H.S.	200	—	220	120	150	—	—	—	—	—	—	—	—	—	130	80	150	—	—	—
Condenser	sq. ft. C.S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Still No. 5																					
Loading Capacity	gal.	2,000	—	2,000	1,500	1,500	—	—	—	—	—	—	—	—	—	2,000	1,500	2,000	—	—	7,500
L.W. retort charges	gal.	185	—	120	300	185	—	—	—	—	—	—	—	—	—	171	200	150	—	—	441
L.W. retort charges	sq. ft. H.S.	250	—	240	140	175	—	—	—	—	—	—	—	—	—	375	200	250	—	—	965
H.W. retort charges	gal.	200	—	220	120	150	—	—	—	—	—	—	—	—	—	220	150	200	—	—	790
H.W. retort charges	sq. ft. H.S.	200	—	220	120	150	—	—	—	—	—	—	—	—	—	220	150	200	—	—	—
Condenser	sq. ft. C.S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Still No. 6																					
Loading Capacity	gal.	—	—	2,000	1,500	1,500	—	—	—	—	—	—	—	—	—	2,000	1,500	2,000	—	—	4,000
L.W. retort charges	gal.	—	—	120	300	185	—	—	—	—	—	—	—	—	—	171	200	150	—	—	291
L.W. retort charges	sq. ft. H.S.	—	—	240	140	175	—	—	—	—	—	—	—	—	—	375	200	250	—	—	515
H.W. retort charges	gal.	—	—	220	120	150	—	—	—	—	—	—	—	—	—	220	150	200	—	—	440
H.W. retort charges	sq. ft. H.S.	—	—	220	120	150	—	—	—	—	—	—	—	—	—	220	150	200	—	—	—
Condenser	sq. ft. C.S.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Continuous Still																					
Number of columns	—	2	—	—	—	1	2	—	—	—	1	—	—	—	—	4*	—	—	—	4	4
Wash/24 hours	48,000	—	—	—	—	40,000	40,000	—	—	—	40,000	—	—	—	—	—	—	—	—	2,000	170,000

* 2 Wash 1 Rectifier 1 Purifier

TABLE II
DISTILLERY QUANTITIES—1959 CROP

	Monymusk	Richmond Llandowery	Frome	New Yarmouth	Canamas	Innswood	Barnett	Worthy Park	Rose Hall	Gray's Inn Central
Cane Juice Used	tons	—	273	—	—	—	—	—	—	—
Total Sugars as R.S.	gal. lb.	284	57,603 91,034	—	—	—	—	—	—	—
Molasses Used	tons	8,130	4,579	8,108	560,432	3,176	522	1,338	457	3,848
Equivalent 80° Beiz	gal.	1,200,950	704,579	482,139	—	484,116	70,173	—	69,666	668,146
Total Sugars as R.S.	lb.	1,313,290	759,683	3,963,863	3,759,282	491,367	79,900	204,331	70,360	4,956,882
Total Sugars Used as R.S.	lb.	10,468,011	1,213,208	6,892,748	—	4,326,617	655,073	1,666,090	562,741	4,763,468
Wash: Set	gal.	815,460	4,875,400	2,637,800	2,643,060	3,169,750	357,200	1,093,780	430,000	4,180,904
Distilled	gal.	9,265,000	802,000	2,618,500	2,690,000	2,810,629	316,000	1,094,760	336,900	—
Rum as Distilled	gal.	381,493	27,074	168,315	89,860	120,764	20,430	49,260	16,301	—
Bulk	gal.	531,038	262,924	134,790	134,790	134,899	25,602	73,381	24,126	—
As Packaged Bulk	gal.	371,822	267,983	—	—	135,818	—	—	22,729	—
Alcohol as Distilled	gal.	26,792	—	133,508	34,308	—	—	—	—	176,660
Bulk	gal.	26,000	—	—	—	—	—	—	—	—
As Packaged Bulk	gal.	37,294	—	—	57,466	—	—	—	—	296,687
As Distilled Proof	gal.	—	—	—	—	—	—	—	—	—
Absolute Alcohol	gal.	—	—	97,049	—	—	16,320	—	—	169,993

TABLE II—continued

	Sevens	Bybrook	Serge Island	Vale Royal	Appleton	Hampton	Hamnden	Bernard Lodge	Holland	Long Fond
Cane Juice Used	tons	—	—	49	—	—	5,371	14	—	5,057
Total Sugars as R.S.	gal. lb.	—	—	8,960 10,481	509,300	102,193	102,193	2,930 4,062	—	1,073,696 1,469,084
Molasses Used	tons	1,179	2,144	822	—	—	3,106	4,230	483	6,437
Equivalent 80° Beiz	gal.	178,866	237,166	126,099	413,114	—	925,837	632,330	67,062	994,100
Total Sugars as R.S.	lb.	1,788,868	2,847,525	1,236,712	—	—	932,192	672,347	61,661	860,902
Total Sugars Used as R.S.	lb.	1,593,868	2,847,525	1,064,177	—	—	—	5,629,186	—	7,928,659
Wash: Set	gal.	1,222,759	1,740,000	779,500	4,105,100	3,162,000	3,162,000	4,747,650	318,600	5,849,100
Distilled	gal.	901,521	1,739,436	726,000	—	—	3,139,000	4,966,860	291,600	6,998,100
Rum as Distilled	gal.	41,593	90,631	40,663	212,344	164,350	221,490	221,490	10,102	272,409
Proof	gal.	61,327	135,468	46,108	—	—	228,803	327,806	14,780	481,440
As Packaged Bulk	gal.	—	97,426	60,608	—	—	156,657	219,740	9,860	237,612
Alcohol as Distilled	gal.	—	—	—	—	—	—	—	—	—
Bulk	gal.	—	—	—	—	—	—	—	—	—
As Packaged Bulk	gal.	—	—	—	—	—	—	—	—	—
As Distilled Proof	gal.	—	—	—	—	—	—	—	—	—
Absolute Alcohol	gal.	34,984	—	—	—	—	—	—	—	—

TABLE III
DISTILLERY ANALYTICAL AND CONTROL DATA

	Moyn- musk	Frome	New Yarmouth	Cay- manas	Innswood	Worthy Park	Gray's Inn Central	Sevens	Bybrook	Serge Island	Bernard Lodge	Long Pond	Moyn- musk
Analysis:													
1. Cane Juice													
Total Sugars as R.S. %	13.67	14.87									13.20	13.09	—
°Brix	16.29	15.49									14.30	13.93	—
2. Molasses													
Total Sugars as R.S. %	57.05	65.76	55.92	55.06	61.38	55.59	57.95	60.30	59.23	57.85	59.37	54.83	56.98
°Brix	93.20	90.59	90.52	90.40	88.61	88.68	89.62	89.63	88.79	86.96	91.67	85.90	93.19
3. Dunder													
°Brix	13.38	11.75	12.56		11.94	13.17			11.72	13.05	15.35	17.77	—
Acidity (as Acetic) %	1.24	1.64	0.74		1.12	1.47			0.85	1.13	1.73	2.98	—
pH	—	—	3.86		—	—			—	—	—	—	—
4. Live Wash													
°Brix	17.72	18.51	18.18	19.50	16.41	18.70	16.60	16.09	18.33	18.24	18.04	18.24	16.46
Total Sugars as R.S. %	11.19	13.31	11.84	13.00	13.35	10.71	10.94	10.68	12.33	10.62	11.04	11.14	9.32
Acidity (as Acetic) %	0.45	0.37	0.30	1.41	0.68	0.44	5.87	0.49	0.21	0.36	0.60	1.57	0.43
pH	—	—	4.79	—	—	—	—	—	—	—	—	—	—
5. Dead Wash													
°Brix	8.57	8.59	8.49	10.20	8.06	8.23	6.85	8.11	8.04	8.96	7.93	8.84	7.30
Acidity (as Acetic) %	0.94	1.55	0.43	0.99	0.80	0.95	—	1.29	0.67	0.75	1.38	2.43	0.91
pH	—	—	4.07	—	—	—	4.18	—	—	—	—	—	—
Total Sugars as R.S. %	1.03	1.41	1.01	1.01	0.95	1.41	0.88	1.01	0.91	—	0.88	0.90	0.87
Proof Spirit %	7.36	9.05	8.26	6.54	6.69	—	7.79	8.53	8.43	8.37	8.48	—	9.86
6. Rum													
Overproof	—	40.00	40.00	50.00	64.02	49.00	—	47.45	49.50	49.04	48.00	58.38	39.20
7. Alcohol													
Overproof	—	—	—	67.50	—	—	68.04	—	—	—	—	—	—
Recoveries:													
1. Fermentation													
Attenuation °Brix	9.15	9.92	9.69	9.30	8.35	10.47	9.75	8.58	10.29	9.28	10.11	9.40	9.16
% Conversion	90.80	89.41	91.48	92.23	92.83	86.83	91.96	90.53	92.56	—	92.03	92.06	91.23
Lb. R.S./gal. Abs. Alc. in Wash	28.63	27.75	32.09	22.63	43.01	—	25.76	35.04	34.02	28.59	24.50	31.42	31.68
2. Distillation													
Gal. Abs. Alc. in Dist./gal. Abs. Alc. in Wash	0.96	0.94	0.79	0.98	1.03	—	0.92	0.77	0.92	0.93	0.84	0.83	0.89
3. Overall													
Lb. R.S./gal. Abs. Alc. in Distillate	29.84	23.25	40.84	23.01	41.90	31.39	28.08	45.55	36.83	30.79	30.09	38.13	35.63
Recovery % theoretical	51.54	46.71	37.66	66.84	36.71	49.00	54.77	33.77	41.76	49.95	51.11	40.34	43.17
Lb. R.S./gal. Proof Alc. in Distillate	17.02	18.97	16.82	27.89	23.90	22.70	16.02	25.99	21.02	17.57	17.17	21.76	20.32
4. Gal. Mol. at 83° Brix/gal. Proof Alcohol	2.12	2.00	2.13	2.92	2.72	2.78	1.91	2.99	2.41	2.07	2.05	2.33	2.57

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